

International Telecommunication Union

ITU-R
Radiocommunication Sector of ITU

Report ITU-R SM.2093-1
(09/2010)

**Guidance on the regulatory framework
for national spectrum management**

SM Series
Spectrum management



International
Telecommunication
Union

Foreword

The role of the Radiocommunication Sector is to ensure the rational, equitable, efficient and economical use of the radio-frequency spectrum by all radiocommunication services, including satellite services, and carry out studies without limit of frequency range on the basis of which Recommendations are adopted.

The regulatory and policy functions of the Radiocommunication Sector are performed by World and Regional Radiocommunication Conferences and Radiocommunication Assemblies supported by Study Groups.

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ITU-R policy on IPR is described in the Common Patent Policy for ITU-T/ITU-R/ISO/IEC referenced in Annex 1 of Resolution ITU-R 1. Forms to be used for the submission of patent statements and licensing declarations by patent holders are available from <http://www.itu.int/ITU-R/go/patents/en> where the Guidelines for Implementation of the Common Patent Policy for ITU-T/ITU-R/ISO/IEC and the ITU-R patent information database can also be found.

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SF	Frequency sharing and coordination between fixed-satellite and fixed service systems
SM	Spectrum management

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REPORT ITU-R SM.2093-1

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for national spectrum management**

(2007-2010)

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1 The international context

The telecommunication sector, including radiocommunications, is organized internationally within the framework of the International Telecommunication Union (ITU), which provides the basic framework for the global coordination and management of the radio-frequency spectrum (see § 1.2.1). In between ITU and the national administrations, two other kinds of organizations, regional organizations and specialized international organizations, are also involved in spectrum management, at either regional or global level.

At the regional level, organizations have been founded that bring together administrations, in some cases associating industry or radiocommunication operators. Their aim is to establish common positions in preparation for ITU decisions, to harmonize national frequency allocations within the relatively flexible framework set by ITU so as to facilitate the coordinated introduction of new services, and to harmonize the standards and procedures for certification of equipment with a view to its free circulation and use in the countries concerned. This is the case in particular for the European Conference of Postal and Telecommunications Administrations (CEPT), and to a lesser extent for the Inter-American Telecommunication Commission (CITEL), the Asia-Pacific Telecommunity (APT) and the Arab Council of Ministers for Telecommunication and Information, which in pursuing these objectives intend to promote the emergence of regional markets and hence to accelerate the development of radiocommunication services.

At the global and regional levels, specialized international organizations also exist in sectors of activity that use radiocommunications and are therefore dependent on spectrum availability: civil aviation, the maritime sector, meteorology, broadcasting, radio amateurs, radio astronomy and research. Section 1.2.3 contains an overview of those organizations, which have close ties with ITU.

The World Trade Organization, within the framework of the General Agreement on Trade in Services (GATS) (see § 1.2.4), while recognizing the sovereign right of States to manage the frequency spectrum in terms of their own objectives, works to develop the instruments required so that exercise of that right does not in fact result in barriers to trade in services between its members.

In this context, the establishment of standards at regional and global levels constitutes one of the fundamental means of promoting efficient and economical use of the spectrum and the development of radio services. Standardization is discussed in § 1.3.

1.1 International principles governing spectrum use

The radio-frequency spectrum is a non-depletable but limited natural resource available in all countries and in outer space. Since any transmitting radio station may cause harmful interference to spectrum uses on Earth or in space, the spectrum is a common resource of mankind that requires rational management by a treaty level agreement among all countries. In that spirit, ITU has been drawing up legal instruments for over a century, so that spectrum use is based on the following fundamental principles set forth in the ITU Constitution (CS):

- a) “while fully recognizing the sovereign right of each State to regulate its telecommunication...” (ref CS-1), “... to avoid harmful interference between the radio stations of different countries” (ref CS-11);
- b) “... to improve the use made of the radio-frequency spectrum for radiocommunication services and of the geostationary-satellite and other satellite orbits” (ref CS-12);
- c) to “facilitate the worldwide standardization of telecommunications, with a satisfactory quality of service” (ref CS-13), and “... to harmonize the development of telecommunication facilities, ... with a view to full advantage being taken of their possibilities” (ref CS-15);
- d) to “foster international cooperation and solidarity ...” (ref CS-14).

The ITU Radio Regulations (RR)¹ constitutes the principle regulatory framework within which States undertake to operate radio services and the basic tool for international spectrum use. They have international treaty status and are periodically reviewed (about every three years) by World Radiocommunication Conferences (WRC), which are attended by most ITU Member States.

The RR specify, *inter alia*, the frequency bands allocated to radio services and the regulatory conditions and procedures that administrations must follow for implementing radio stations providing those services. The guiding principle underlying all RR provisions is that new uses must avoid causing harmful interference to the services provided by stations using frequencies assigned to them in accordance with the RR and recorded favourably in the Master International Frequency Register (MIFR).

The RRs, as drawn up by successive WRCs in the past years, aims to allow each country the greatest possible flexibility with regard to spectrum use. In particular, the Table of Frequency Allocations (RR Article 5) authorizes several radiocommunication services in each band; those services are not necessarily compatible locally, but each country can select those it wishes to implement on its territory. The RR’s regulatory provisions and procedures then enable each country to coordinate, as required, the stations providing the services selected with those of other countries that may be affected, thus maximizing the efficient utilization of the spectrum.

This relatively flexible framework has the advantage of respecting the wide range of countries’ spectrum needs and their sovereign right to meet those needs as long as it does not place undue constraints on other countries. It has the disadvantage of limiting economies of scale and the capacity for interoperability required to develop radiocommunications, in particular within the framework of worldwide services or those intended for the general public (e.g. mobile telephony, satellite broadcasting). For this reason, a major effort has been made in the past years to harmonize

¹ In the following text, the acronym RR when using the singular refers to the document itself (the ITU Radio Regulations).

spectrum use at regional, or even global level, in particular with regard to mobile telephony. The activity towards harmonization has been to identify specific frequency bands for applications, corresponding to specific standards (see § 1.2.2 and 1.3). The purpose of this harmonization is to increase economy of scales and decrease interference and incompatibilities.

1.2 Multilateral agreements

1.2.1 International Telecommunication Union (ITU)

The agreements, which in fact are a treaty binding the Member States within the framework of ITU, lay the foundation for spectrum management worldwide. ITU international agreements recognize that utilization of the radio-frequency spectrum is a matter of State sovereignty, but that to be efficient it must be regulated. They are the basic global instruments with which, States, in ratifying such a work, undertake to respect common rules for sharing and using the spectrum, the goal being efficient utilization and equitable access.

The ITU instruments relevant to spectrum management are the Constitution (CS), the Convention (CV) and, mainly, the Radio Regulations (RR). These instruments are only binding on the Member States among themselves.

Article 6 No. 37 of the CS states “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, except in regard to services exempted from these obligations in accordance with the provisions of Article 48 of this Constitution”.

And further, No. 38 of the same article states “The Member States are also bound to take the necessary steps to impose the observance of the provisions of this Constitution, the Convention and the Administrative Regulations upon operating agencies authorized by them ...”

Compliance with these instruments therefore presupposes that each State may also take, to the extent outlined above, the measures necessary (legislation, regulations, clauses in licences and authorizations) to extend into the domestic regime the obligations of such instruments to other spectrum users (operators, administrations, individuals, etc.).

1.2.1.1 The ITU Constitution: General organization and basic principles

The Constitution is the basic instrument of the Union. It deals essentially with matters of organization, Article 4 (CS 31) giving the RR international treaty status and Chapter II dealing with the Radiocommunication Sector. It also sets forth the basic principles for spectrum management, in particular in Article 1 (purposes of the Union), Nos. 11 and 12, and Chapter VII.

Thus, each State is free to regulate radiocommunications as it sees fit, provided it does not interfere with the rights of other States. Those rights, and their respective priority, are defined in the RR.

In that context, the Constitution entrusts ITU’s Radiocommunication Sector (ITU-R) with the task of ensuring “rational, equitable, efficient and economical use of the radio-frequency spectrum by all radiocommunication services” (CS-78).

1.2.1.2 The ITU Convention: A complement to the Constitution

The Convention essentially complements the Constitution in terms of how the Union’s institutions function. In particular, § 5 describes the functioning of the Radiocommunication Sector, *inter alia*, the study groups, the Radiocommunication Bureau (BR) and the Radio Regulations Board (RRB), all of which play a major role in international spectrum management: the study groups develop Recommendations and reports that are recognized worldwide (only Recommendations incorporated

by reference into the RR are binding); the BR manages (initiating procedures, verifying compliance with the rules, registering assignments thus establishing priorities) requests for usage rights made by the States; and the RRB approves when needed the Rules of Procedure to be used by BR in applying the Radio Regulations and examines any problem concerning the application that cannot be resolved by applying those Regulations.

1.2.1.3 The Radio Regulations (RR)

The RR contains detailed provisions on frequency use. They are the basic treaty document establishing the relative rights of States when differing uses may give rise to mutual interference. The RR specifies, in particular, compiled in relative Articles and Appendices, among other regulations:

- the Table of frequency allocations for the different radio services and their relative status (Article 5). The table was drawn up with a view to allowing each frequency band to be shared by a maximum number of services whose operation by the countries concerned is considered to be compatible, if necessary through coordination;
- the maximum values of the power radiated by the radio stations (Articles 21 and 22) and the regulatory procedures (Articles 9, 11, 12) for ensuring compatibility through coordination and notifications;
- for certain services in certain bands, the Plans giving each country guaranteed access to the spectrum for the operation of those services, in particular mobile services (Appendices 25, 26 and 27), HF broadcasting (Article 12), satellite broadcasting (Appendices 30 and 30A), and fixed-satellite service (Appendix 30B) and recently the Plans emanating from the Regional Radiocommunication Conference (RRC-06);
- the methods and technical criteria for determining whether the implementation of a radio station calls for coordination with other administrations (Appendices 4, 5, 7 and 8);
- various administrative provisions, including Article 18 which requires each Member State to grant a licence to any transmitting station to be operated by any private person or any enterprise.

The principle underpinning all these provisions is set forth in RR No. 4.3, which stipulates that any new assignment (i.e. any new authorization to operate a radio station) must 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 (Article 5) and the other provisions of the Radio Regulations, the characteristics of which are recorded in the Master International Frequency Register (MIFR).

In particular, a new assignment can only be recorded in the MIFR with a favourable finding after completion of a procedure (for instance, Articles 9 and 11) aimed at ensuring that it will not cause harmful interference to assignments made in accordance with the RR and previously recorded.

1.2.2 Regional harmonization

This section gives an overview of regional activities.

1.2.2.1 APT

The Asia Pacific Telecommunity² comprises 32 Member States along with Associate Members and Affiliates. It commenced its activities in 1979 and has a mandate, amongst other matters, to develop regional cooperation in areas of common interest, including radiocommunications and standards development.

² <http://www.aptssec.org> (11/2003).

The APT works to harmonize the views of its member states on radio spectrum use and management, particularly in terms of proposals to ITU WRC, but does not have a mandate to undertake a wider spectrum management or regulatory role in the region. Harmonization of WRC proposals is undertaken through a preparatory group (APG) in a way that recognizes the agenda items of the particular WRC.

Other harmonization on a voluntary approach may be undertaken on specific matters from time to time as required. For example IMT services in the area are being harmonized through the APTIF forum, and telecommunications standards are addressed through ASTAP, both part of the APT organization.

1.2.2.2 The Arab Council of Ministers for Telecommunication and Information

This Council is the supreme organ in the League of Arab States (LAS) dealing with telecommunication, information and postal services for the Arab world. It comprises the 21 Member States of the League. The Council created permanent Committee and permanent groups for different activities, reporting directly to its executive branch, composed of seven ministers by election and meeting twice a year in order to prepare the work for the whole council.

Among the permanent groups is the Arab Spectrum Management Group (ASMG).

1.2.2.2.1 ASMG

The ASMG was created by the Arab Council of Ministers in 2001 as a permanent group mandated with the following main tasks:

- a) Exchange experiences on:
 - National planning of the spectrum allocation and national procedures for assignments.
 - Technical means to monitor the use of the spectrum, including the collaboration for this monitoring.
 - Resolving incompatibilities in the use of the radio spectrum, through the application of the RR.
- b) Exchange of recognized national specialization and type approval procedures for radio equipment in order to harmonize and unify such specializations and approved them as far as possible.
- c) Propose efficient and rationalized means for the use of the spectrum in order to meet the spectrum needs for the Arab States.
- d) Unify national spectrum management legislation among Arab States for the use of the radio equipment.
- e) Coordinate Arab States position vis-à-vis all conferences dealing with the radio spectrum, in particular for WRC and RRCs, in order to establish common proposals and positions depending the interest of the Arab States.
- f) Collaborate efficiently with groups, and participate actively in spectrum coordination meetings of such groups.
- g) Encourage the use of modern means for notification and recording of the spectrum including the adoption of common software for such aim.
- h) Coordinate Arab States positions in ITU-R Study Groups, as well as for the RAG and the Special Committee and the follow up of the RRB activities.
- i) Any other tasks assigned by its executive branch or by the Council of Ministers.

1.2.2.3 Rules on spectrum use and CEPT

The European Conference of Postal and Telecommunications Administrations³ (CEPT) comprises 46 European administrations. In the 1990s, it opened a permanent office in Copenhagen (ERO, European Radiocommunications Office) that provides support for CEPT activities, especially the dissemination of information (working papers, publications, conferences), and preparatory work (questionnaires, tables, studies).

Following the merging of the radio (ERC) and telecommunication (ECTRA) committees in the autumn of 2001, CEPT has two current committees, the Electronic Communications Committee (ECC) and the other on postal matters (CERP). CEPT activities are conducted mainly by the committees and decisions are usually adopted by consensus. Those decisions are not binding, however, and all CEPT activities are based on a voluntary approach. The experience of the past ten years has shown that most CEPT decisions are implemented by a large majority of the members, even though they are not binding, and even if some administrations have not signed the decisions in question. This is true of most important matters (UMTS, S-PCS) and has also been observed at WRCs, where joint European positions enjoy the broad support of the European countries.

In the field of radiocommunications, CEPT deals mainly with spectrum management, spectrum engineering and regulatory questions within three working groups. They have a shared objective to define frequency use in Europe on the basis of the RR. This is done one level of detail up from the global level, which greatly facilitates the work of national administrations. The groups' output can be obtained on ERO's website⁴.

A major study has been carried out since 1993 within the framework of the Detailed Spectrum Investigation (DSI) project in order to forecast trends in spectrum organization. The final phase was completed in early spring 2001. The study led to the adoption of the European Common Allocation Table (ECA) of ERC Report 25, available on ERO's website.

CEPT decisions designate frequency bands, conditions of use, and, if necessary, the conditions for sharing and the schedule of band availability for the services, applications and systems concerned. Each decision also lists the national administrations that implement it. CEPT decisions are adopted by consensus among the European administrations and are not binding. Their implementation is therefore the responsibility of the national authorities only.

Certain CEPT decisions refer to the European Telecommunications Standards Institute⁵ (ETSI) standards. These are non-binding reference documents used to prepare decisions and required for their application (trials, masks, etc.). CEPT and ETSI have signed a memorandum of understanding with a view to guaranteeing the compatibility of their activities. A detailed description of the organization of standardization is given in § 1.3.

CEPT has also signed a memorandum of understanding with the European Commission in order to coordinate its activities with those of the Commission.

1.2.2.3.1 Radio-frequency spectrum regulation and the EU

The European Union (EU) has general competence for spectrum policy since the adoption of the Radio Spectrum Decision 676/2002/EC by the Council and the European Parliament in March 2002. This decision is part of the new EU regulatory framework for electronic communications. The Decision establishes a cooperation mechanism through the Radio Spectrum Committee (RSC), which allow the European Commission (EC) to address mandates to CEPT on the harmonization of frequency use. The Radio Spectrum Committee (RSC) has the status of

³ <http://www.cept.org> (11/2003).

⁴ <http://www.ero.dk> (11/2003).

⁵ <http://www.etsi.org> (11/2003).

a committee of Member States and is chaired by the European Commission under the Spectrum Decision. The RSC's purpose is to assist the Commission in the development and adoption of technical implementing measures aimed at harmonizing the conditions for the availability and efficient use of radio spectrum, as well as ensuring the availability of information related to the use of radio spectrum. The EU Decision replaces the case by case approach applied before and which governed frequencies covering mainly two fields: mobile communications (second and third generations, known as GSM and UMTS respectively) and S-PCS (satellite personal communications services).

A consultative group, the Radio Spectrum Policy Group (RSPG) established under a separate Commission Decision with representation of high level governmental experts from Member States, advises the Commission on radio spectrum policy issues, including radio spectrum availability, harmonization and allocation of radio spectrum, provision of information concerning allocation, availability and use of radio spectrum, methods for granting rights to use spectrum, refarming, relocation, valuation and efficient use of radio spectrum as well as protection of human health. RSPG consults extensively with stakeholders (CEPT, ETSI), both commercial and non-commercial, as well as with any other interested parties, in full transparency.

In addition to the regulations on communication services, the EU has adopted the Radio and Telecommunications Terminal Equipment Directive (R&TTE) in 2001, making the free circulation of such equipment mandatory. The R&TTE Directive also imposes transparency and the publication of information on radio interfaces and national frequency allocation tables. Although the R&TTE Directive applies only to equipment, it has a definite impact on spectrum management, imposing a high degree of harmonization among EU countries.

The European Union finalized the establishment of a regulatory framework for strategic planning and the harmonization of spectrum use within the Union⁶ with the following objectives:

- to establish a framework of procedures to ensure effective implementation of radio-frequency spectrum regulations throughout the EU;
- to ensure that information on radio spectrum use is provided in a timely and coordinated manner and that it is available throughout the EU;
- to protect EU interests in international negotiations when modification to the use of the radio spectrum could affect EU policy.

1.2.2.3.2 European sector organizations

Three organizations must be mentioned: ESF-CRAF, Eurocontrol and EBU, dealing respectively with astronomy, civil aviation and broadcasting.

The European Science Foundation (ESF) represents all fields of science. It established a committee on the sciences of engineering and physics, which includes the Committee on Radio Astronomy Frequencies, or CRAF⁷. CRAF has observer status with CEPT and cooperates on CEPT issues that are relevant to its members' activities.

Eurocontrol⁸ manages air traffic in European air space (38 countries). Because of the huge rise in traffic, special efforts have been made to keep average delays below 3.5 min per flight while maintaining the required safety levels. That objective calls for efficient communication and hence the availability of frequencies in good conditions.

⁶ http://europa.eu.int/information_society/topics/telecoms/radiospec/radio/index_en.htm (11/2003).

⁷ <http://www.esf.org> and <http://www.astron.nl/craf> (11/2003).

⁸ <http://www.eurocontrol.int>.

The European Broadcasting Union (EBU⁹) is an association of national broadcasters; it has 69 Members in Europe, North Africa and the Near East, and 45 Associate Members in 28 non-European countries. It provides a series of operational, technical, commercial, legal and strategic services (broadcasting rights for major sports events, management of Eurovision and Euroradio networks, programme exchanges, the promotion and coordination of co-productions). Cooperation on technical matters is one of its main activities, and to that end it set up a technical committee, the Broadcast system Management Committee (BMC), which has two principal tasks, one concerning new broadcasting systems, the other spectrum planning and management. The BMC has been a driving force for and furthered the development of digital audio broadcasting (DAB) and digital video broadcasting (DVB). CEPT and the EBU are cooperating, for example, on preparations for two DAB and DVB planning conferences in Europe. At the international level, EBU works with sister unions in other parts of the world (ABU in Asia, NABA in North America, URTNA in Africa, ASBU in the Arab States and OTI in Latin America)¹⁰.

1.2.2.4 CITEL

1.2.2.4.1 Introduction to CITEL Organization¹¹

The Inter-American Telecommunication Commission (CITEL), an entity of the Organization of American States, is the main Forum in which the governments and the private sector meet to coordinate regional efforts to develop the Global Information Society according to the mandates of the General Assembly of the Organization and the mandates entrusted to it by Heads of State and Government at the Summits of the Americas.

CITEL endeavours to make telecommunications a catalyst for the dynamic development of the Americas by working with governments and the private sector. Under the auspices of the Organization of American States, it resides in Washington, DC, USA. It has 35 Member States and over 200 Associate Members.

1.2.2.4.2 CITEL Structure and Committees

The CITEL structure, beyond the CITEL Assembly, is based on a committee organization:

- Permanent Executive Committee (COM/CITEL).
- Permanent Consultative Committee I: Telecommunication Standardization (PCC I).
- Permanent Consultative Committee II: Radiocommunication including Broadcasting (PCC II).
- Steering Committee.
- Conference Preparatory Working Group.

The CITEL Committee directly related to spectrum issues is the PCC II – Radiocommunication including Broadcasting, which objective is to act as a technical advisory body within the Inter-American Telecommunication Commission with respect to the coordination and harmonization of standards related to spectrum use and the planning and efficient use of the radio-frequency spectrum and satellite orbits for radiocommunication services, including broadcasting.

⁹ <http://www.ebu.ch>.

¹⁰ <http://www.abu.org.my>; www.nabanet.com; www.asbu.org.tn; www.urtna.org; www.esmas.cpm/oti/.

¹¹ <http://www.citel.oas.org> (11/2003).

The PCC II mandates, in accordance with the ITU Radio Regulations and taking into account ITU Recommendations, are:

- a) to promote among Member States harmonization in the utilization of the radio-frequency spectrum and the operation of radiocommunication services, including broadcasting, in all their different modalities, bearing especially in mind the need to prevent and avoid, to the extent possible, harmful interference between the different services;
- b) to stimulate and foster the development of radiocommunication services, including broadcasting, in the region;
- c) to promote the development and implementation of modern technologies and new radiocommunication services, including broadcasting, specifically their technical and operational aspects, to meet the needs of Member States;
- d) to undertake the coordination of regional preparations for ITU World and Regional Radiocommunication Conferences, including the preparation of Inter-American Proposals (IAPs) and common positions, as well as to undertake inter-regional consultations in preparation for these conferences;
- e) to undertake a coordinated effort with the different CITELE groups in those areas that, by their very nature lend themselves to joint action;
- f) to undertake the coordination and harmonization of standards related to spectrum use such as over-the-air broadcasting and common air-interfaces for radiocommunication services.

1.2.3 Specialized international organizations

1.2.3.1 Organizations using government radio frequencies

These are in principle United Nations specialized organizations. The activities concerned are aviation, marine and weather surveillance activities requiring a high level of coordination and harmonization in spectrum at world level with a view to guaranteeing the safety of life and property. It is inconceivable that these organizations should have conflicts with ITU, and the spectrum allocated to the services used by them is well recognized in the RR. These specialized organizations are ICAO, IMO and WMO.

The Convention establishing the International Civil Aviation Organization (ICAO)¹² was signed in Chicago on 7 December 1944 and has been ratified by 185 States. Spectrum access is a prerequisite for this sector, whose growth has consistently been above average.

The Convention establishing the International Maritime Organization (IMO)¹³ was signed in 1958. IMO has 158 Member States. In 1960 the Member States adopted the International Convention for the Safety of Life at Sea (SOLAS). Advances in communication technology have enabled IMO to make substantial improvements to the Global Maritime Distress and Safety System (GMDSS), which was introduced in 1992 and became fully operational in February 1999. The radio spectrum is obviously a key resource for IMO, for the development of the GMDSS and for the transition from analogue to digital technology.

The World Meteorological Organization (WMO)¹⁴ has 185 Member Organizations and provides the authoritative scientific voice on the state and behaviour of the Earth's climate and atmosphere. WMO's goal is to facilitate international cooperation in the establishment of networks of stations for making meteorological, hydrological and other observations. The World Weather Watch (WWW), whose telecommunication system comprises four polar-orbiting and five geostationary

¹² <http://www.icao.int> (11/2003).

¹³ <http://www.imo.org> (11/2003).

¹⁴ <http://www.wmo.ch> (11/2003).

satellites, about 10 000 land observation and 7 000 ship stations, is the backbone of its activities. The data collected by the system are disseminated to countless organizations throughout the world and are essential for numerous activities such as the provision of energy and water, garbage collection and public transport, agriculture and civil aviation. The means of observation also include radar using radio frequencies and telecommunications.

1.2.3.2 Organizations using frequencies for non-governmental services

This second category comprises radio amateur and radioastronomy organizations.

Because it uses an international natural resource – the radio spectrum – amateur radio must organize nationally and internationally for better mutual use of the radio spectrum among radio amateurs throughout the world, to develop amateur radio worldwide and to successfully interact with the agencies responsible for allocating and managing radio frequencies. The International Amateur Radio Union (IARU)¹⁵ has been the watchdog and spokesman for the world amateur radio community since 1925. The IARU Constitution, last amended in 1989, organizes IARU into three regional organizations that correspond to ITU-R's three Regions (1, 2, 3).

The International Astronomical Union (IAU) was founded in 1919. Its mission is to promote and safeguard the science of astronomy in all its aspects through international cooperation. Its individual members are professional astronomers all over the world. With over 8 300 individual members and 66 Adhering Countries, IAU plays a pivotal role in promoting and coordinating worldwide cooperation in astronomy. The IAU is co-sponsor, along with the Union Radio Science International (URSI) and the Committee on Space Research (COSPAR) of the Scientific Committee on Frequency Allocations for Radio Astronomy and Space Science (IUCAF), which represents the interests of radio astronomy at ITU-R, where it is a Sector Member.

1.2.4 The World Trade Organization (WTO)¹⁶

The General Agreement on Trade in Services (GATS)¹⁷ recognizes the sovereign right of member states to regulate, and to introduce new regulations, on the supply of services within their territories in order to meet national policy objectives. That right should take into consideration Article VI (see Annex 3) and other relevant GATS provisions, notably in terms of transparency and timing.

The GATS applies to the national spectrum management process and to the attribution of licences. As stipulated in Article VI (see Annex 1), the sovereign right of each WTO member to manage frequencies should be administered in a “reasonable, objective and impartial manner” and should not nullify or impair specific commitments.

The members who have made an additional commitment under the Reference Paper on regulatory principles are bound by that text, which stipulates that when it comes to allocating scarce resources, the procedure followed should be objective, timely, transparent and non-discriminatory. The GATS, nevertheless, recognizes that spectrum management policy, if implemented in conformity with that provision, does not of itself constitute a hidden barrier to trade.

In the framework of the new round of negotiations on trade in services started in 2000, a working group has been established to develop a code of required conduct so that measures affecting licensing and procedural demands, technical standards and the requirements and procedures for qualification do not constitute pointless barriers to trade in services. This code of conduct is intended to replace the regulatory principles mentioned in the preceding paragraph. Such a code should not conflict with the principles of the RR.

¹⁵ <http://www.iau.org> (11/2003).

¹⁶ <http://www.wto.org>.

¹⁷ http://www.wto.org/english/docs_e/legal_e/26-gats.pdf.

1.3 Standardization at the international, regional and national levels which might have implications on the regulatory framework for national spectrum management

Standards are the outcome of a fairly complex process involving organizations at the international, regional and even national levels. The European situation was described above. Its policy is based on the so-called “New Approach” defining in particular the linkage between regulation, standardization and certification. Within this framework, the EU policy defines essential requirements, and conformity with referenced harmonized standards is considered as conformity with essential requirements. However, it is possible to refer directly to essential requirements in particular if a notified body agrees on equivalent rules and test. Certification is the procedure proving the conformity with relevant standards and which can be undertaken either by the company responsible for the product or the service, or by a certification body.

1.3.1 The structure of international standardization

ITU offers a global intergovernmental forum in which problems can be discussed with all willing parties concerned. It is both a source of information and a place to formulate global solutions in the form of recommendations adopted on a consensus basis.

As in any organization dealing with standardization, the participation of Sector Members (entrepreneurs, operating agencies) is allowed by ITU, since they are in the best position to express market needs and technological trends. Such participation is of benefit at all levels: national or regional preparation and in ITU meetings.

There is obviously a close collaboration between ITU and national/regional standardization bodies. The latter wish to promote the standardization solutions they have identified as best meeting a specific need. On the other hand, all national or regional bodies stand to gain from ITU’s role in defining global standards that offer numerous benefits in terms of cost reduction and market harmonization.

One ITU project, IMT-2000, is an outstanding example of such a relationship. In that case, ITU had established a procedure for submitting the IMT-2000 radio interfaces proposed by the national/regional standardization bodies. Those interfaces were then evaluated, and a final “consensus-building” phase resulted in a reduction in the number of interfaces in the terrestrial component of IMT-2000 and in the greatest possible number of common features between them. This is a key factor in ensuring the success of IMT-2000 as a global mobile system with a global roaming capabilities.

The IMT-2000 example also demonstrates the growing importance of external bodies such as the Partnership Projects (PPs) established to develop the specifications for a given technology (3GPP for IMT-2000 CDMA-DS and CDMA-TD, and 3GPP2 for IMT-2000 CDMA-MC). In terms of IMT-2000, the purpose of the documents prepared by the Partnership Projects was to obtain recognition by ITU as elements of IMT-2000 specifications and endorsement by the various national/regional standardization bodies as standards in their own right.

1.3.2 An example of standardization at a regional level: the structure of European standardization

Europe has established a standardization body, ETSI¹⁸. It supplements the European Committee for Standardization (CEN) and the European Committee for Electro technical Standardization (CENELEC)¹⁹, the two other European standardization bodies. Any European organization proving an interest in promoting European telecommunication standards has the right to represent that

¹⁸ <http://www.etsi.org> (11/2003).

¹⁹ Internet sites: CEN: <http://www.cenorm.be> and CENELEC: <http://www.cenelec.org> (11/2003).

interest in ETSI and thus to directly influence the standards-making process. As a result, most non-European companies with a branch in Europe are members of ETSI, and indeed this is the case of many American and Japanese companies.

ETSI responds to market needs with a variety of products ranging from standards to reports: ETSI EN (European Standard – telecommunications series), adopted after ETSI membership national weighted voting, ETSI ES (ETSI Standard) and ETSI EG (ETSI Guide), adopted after ETSI membership weighted voting, and ETSI TS (ETSI Technical Specification) and ETSI TR (ETSI Technical Report), adopted by the responsible technical body.

National Committees have been established in all ETSI member countries. Their task is to cast the national vote for the EN. They also usually provide a forum for discussion between the different national interests of the positions to be defended at ETSI meetings. However, ETSI is dominated mainly by entrepreneurs (network operators and manufacturers), with administrations being active principally in CEPT. CEPT has therefore signed a memorandum of understanding with ETSI in order to ensure effective cooperation between the two and to avoid any inconsistency between European standards and regulations. As a result, standardization and regulation are more distinctly separated at European level than within ITU.

ETSI promotes the worldwide standardization process whenever possible. Its Work Programme is based on, and coordinated with, the activities of international standardization bodies, mainly ITU-T and ITU-R.

1.3.2.1 Standards and legal framework in Europe

European legal policy relating to standardization was finalized by mid-2002 for implementation in 2003.

Under that approach, ETSI is given mandates by the European Commission to produce European Standards (EN). Once these standards are approved by ETSI, the list of their references is published in the European official gazette and they become Harmonized Standards (HS). Equipment which meets harmonized standards is presumed to comply with the essential requirements of the R&TTE Directive (Radio and Telecommunications Terminal Equipment Directive, 1999/5/EC).

Under the New Approach, the standards are in principle voluntary and do not preclude recourse to other means of demonstrating compliance with the essential requirements of the R&TTE Directive. In that case, the R&TTE notified bodies must decide on the relevant series of tests to be applied to the equipment.

Harmonized standards do not provide a complete description of a product but only the minimum specifications required to demonstrate compliance with the Directive's essential requirements. The link between the tests and the essential requirements must be fully proven. A particularly pertinent essential requirement is that contained in Article 3.2 of the Directive, which stipulates that: "radio equipment shall be so constructed that it effectively uses the spectrum allocated to terrestrial/space radiocommunication and orbital resources so as to avoid harmful interference".

There is a very strong link between standardization and regulatory structures and this may explain the importance given in Europe to the production of candidate Harmonized Standards.

1.3.2.2 The structure of certification in Europe

Conformity with appropriate standards can be evaluated in different ways. In the European Union, the above-mentioned "New Approach" often refers to certification procedures, either by an independent body or by the entrepreneur, depending on the prevailing rules. In the former case, the certification bodies must apply the relevant ISO standards and are monitored by all certification bodies brought together in a European association. In the latter case, companies are usually required to meet ISO 9000 standards.

Certification in Europe is intended to provide all the parties involved, including companies and administrations, with a high level of confidence.

A more traditional procedure for the evaluation of conformity with standards is type-approval, which requires final approval by the administration. In Europe, this procedure is gradually giving way to certification procedures by manufacturers.

1.3.2.3 The national level in Europe

In the European Union, standardization at the national level has almost disappeared. National standards, when they do exist, merely reflect European standards and national policy is to implement European policy.

1.3.3 The global level according to WTO rules

According to the GATS, the member states must take account of the international standards produced by the competent standardization organizations (such as ITU) in drawing up their regulations. The objective is obviously to make sure standards are not used as barriers to trade.

Thus, Section 6 (a) of the GATS Annex on Telecommunications recognizes that an efficient, advanced telecommunications infrastructure in countries, particularly developing countries, is essential to the expansion of their trade in services. To that end, it endorses and encourages the participation, to the fullest extent practicable, of developed and developing countries and their suppliers of public telecommunications transport networks and services and other entities in the development programmes of international and regional organizations, including ITU. The importance of international standards for global compatibility and interoperability of telecommunication networks and services is also recognized, as is the promotion of such standards through the work of relevant international bodies, mainly ITU.

Because of WTO's growing impact on ITU work, an agreement has been reached by the two organizations to encourage cooperation between them and to give ITU observer status in the relevant WTO meetings and vice versa.

1.4 Multilateral agreements

Within the framework of RR procedures or regional agreements (such as the Vienna Agreement²⁰ for some European countries), administrations coordinate the operation of radio stations within their territory whose operation could cause harmful interference to the stations situated on the territory of other administrations. Such cases often require coordination, which usually end with a coordination agreement specifying the conditions in which each administration will operate its radio stations in order to avoid mutual harmful interference. This type of multilateral agreement is a long-term commitment aimed at ensuring sound management of the spectrum shared by neighbouring countries and countries that could be affected. Some administrations develop bilateral agreements that encourage the coordination of frequencies among individual licensees within the border coordination zone. In such cases, administrations have oversight authority for the coordination process and agreements may need to be developed between operators and ratified by the concerned administrations.

²⁰ The Vienna Agreement is a regional European border coordination agreement on the co-ordination of frequencies between 29.7 MHz and 39.5 GHz for the fixed service and the land mobile service. Since its latest revision of 12 October 2005, signed in Vilnius by 17 European Administrations, it is now named HCM Agreement.

If an administration plans to operate a satellite network, the associated space radio stations are situated in space, and the earth stations may be located in a service area potentially covering the territory of many countries. For that reason, administrations whose satellite networks are likely to give rise to mutual harmful interference engage in frequency coordination, taking account of earth stations that may be located anywhere in the service area. As in the previous case, coordination results in bilateral (exceptionally multilateral) agreements constituting long-term commitments aimed at ensuring sound management of the spectrum shared by all the countries (the orbit/spectrum resource).

Coordination between satellite networks therefore only guarantees compatibility between those networks, meaning operation without mutual harmful interference among any space station or earth station within either network. This does not give the earth stations in any satellite network the right to use the spectrum within the territory of the country in which they are located. That right is obviously conditioned by successful coordination of the corresponding frequencies with the other radio stations that may be affected (in the same country or in neighbouring countries) within the same spectrum.

2 The national context

2.1 Principles of national spectrum use

2.1.1 Rights and obligations with regard to the spectrum

The radio-frequency spectrum is in the State's public domain. As such, it is subject to State authority and must be managed efficiently so as to be of the greatest benefit to the entire population. This spectrum management usually takes place within a regulatory framework comprised of legislation, regulation, procedures and policies.

As the result of the State's right to manage the spectrum, authorized spectrum users derive the benefits of the right and associated obligations to access and use the spectrum.

2.1.1.1 State rights and obligations

2.1.1.1.1 Division of the spectrum and associated provisions

It is up to the State, or a delegated regulatory authority, to allocate frequency bands for government or administrative uses, broadcasting and telecommunications in the private industrial and commercial sector, taking into account the ITU Table of Frequency Allocations (RR Article 5) with due regard to the State's international commitments.

The managing authority draws up the national frequency allocation table and the national frequency register listing frequency assignments and keeps them up to date.

It is responsible for coordinating the establishment, on national territory, of radio stations so as to ensure optimal use of available sites with a view to obtaining the best possible overall electromagnetic compatibility.

The State can include provisions in its regulatory framework aimed at protecting transmitting and receiving radio centres from obstructions, and at protecting receiving radio centres from electromagnetic interference. The State, or the managing authority, can impose effective and appropriate spectrum utilization, taking account of the available technology and the development of society.

In order to ensure optimum use of the frequency spectrum, the managing authority may proceed to reaffirming that this objective can be achieved either through the direct exercise of authority or through a negotiated process involving a financial consideration or by a procedure combining the two approaches. For example, the managing authority can use spectrum redeployment²¹.

As regards the public domain, the managing authority may make arrangements, including through a unilateral procedure (for example, licence revocation for non-utilization of assigned frequencies), in order to ensure the proper execution of missions of general interest or public service.

2.1.1.1.2 Spectrum utilization for broadcasting and for telecommunications purposes in the private commercial and industrial sector

The utilization of frequencies on the national territory either to transmit or to transmit and receive signals is subject to administrative authorization (licence). The State, or a delegated managing authority (which in some countries is not necessarily the same as the regulatory authority mentioned in the section above), grants individual authorizations to use the spectrum on national territory by assigning specific frequencies.

In the case of radio stations situated in an extraterritorial area (sea, space), the States or delegated authorities can also grant authorizations, in compliance with the RR and any relevant international agreements (see § 1.2.1, 1.2.2 and 1.3.2).

In exceptional cases, and in the conditions set forth in the national regulations, low-power, short-range radio telecommunication facilities and facilities not using frequencies specifically assigned to their user can be freely established. The State may require authorized operators to pay a compensation for the right to use the spectrum. This compensation should be in proportion to the estimated value of the resource (see § 2.1.4).

The State, or the delegated managing authority, can impose terms and conditions of general interest on authorized operators.

The competent authority must define the technical standards and essential requirements with regard to:

- public health;
- electromagnetic compatibility;
- efficient utilization of the spectrum allocated to terrestrial or space stations and of orbital resources in order to avoid harmful interference.

The radio equipment whose use is authorized on the national territory must comply with these standards and essential requirements.

2.1.1.1.3 Prevention and elimination of interference

The State, or its delegated authorities, must ensure that the spectrum is utilized in conformity with the conditions stipulated in national and international regulations, in particular Article 15 of the RR. They must ensure that equipment is not sold unless it conforms to the essential standards and requirements set forth in national regulations. They must also take steps to prevent unauthorized utilization of the spectrum by employing methods such as:

- monitoring the spectrum and seeking out unauthorized radio stations;
- managing licences giving access to the spectrum and monitoring the technical and operating conditions of radio stations;

²¹ Recommendation ITU-R SM.1603 –Spectrum redeployment as a method of national spectrum management.

- identifying the sources of interferences in response to complaints.

The State, or its managing authorities, must put a stop to any recognized harmful interference observed.

Depending on national law, the State's liability may be incurred when an interest has been infringed. A claim may be made by any person, foreign or not, having suffered damages. The State may be charged with a variety of faults: failure to act, insufficient means, inefficiency, delayed action, seriousness of the infringement of a general interest, etc, such infringement shall conform to the legislation of such country.

2.1.1.2 Rights and obligations of the authorized users

The authorization (or licence) does not confer ownership of part of the spectrum but only the right to use it for a period of time specified in the authorization and in accordance with the rules contained in the terms and conditions attached thereto.

The State, or the delegated managing authority, may limit the number of authorizations giving access to the spectrum because of the technical constraints inherent in frequency availability. The authorization may not be transferred unless so provided in the national regulatory framework.

The State or delegated authority endeavours to provide a level of protection to the users from harmful interference. The authorized users must respect the general rules and those laid down in the terms and conditions, and may only utilize those frequencies it has been assigned.

The terms and conditions for telecommunication operators authorized to set up a public network may also contain obligations of a general nature, such as:

- minimum coverage of the population or the territory;
- a minimum number of services offered to consumers and a minimum quality threshold;
- guaranteed protection of personal data and the private lives of users and secure electronic exchanges.

The authorized user is in breach of its authorization should it fail to comply with its obligations. Depending on the seriousness of the non-compliance, the penalty may be:

- total or partial suspension, reduction in the duration or withdrawal of the authorization;
- a financial penalty if the non-compliance did not constitute a criminal offence.

Penal sanctions (imprisonment and/or fines) may be instituted by the national laws for the most serious offences, such as:

- unauthorized establishment or maintenance in violation of a decision to suspend or withdraw the authorization;
- interference with an authorized service by making unauthorized use of a frequency or by using a radio facility that does not meet the applicable essential requirements;
- for broadcasting, violation of the provisions on the power or location of the transmitter.

2.1.2 Examples of possible approaches to management of national spectrum organization

The institutional organization of spectrum management varies widely from one country to another. The reasons for this are considered in § 2.3.

The creation of an independent regulatory function in the area of telecommunications often goes hand-in-hand with a discussion of the division of labour, i.e. the respective prerogatives of the national regulatory authority (that which decides on national frequency allocations, in particular between governmental and commercial services) and the “regulator” (the authority regulating access by telecommunication and broadcasting operators to scarce resources, such as the spectrum, and deciding, for example, that certain candidates will not have access to the spectrum).

But whether in terms of the genuine independence of the regulatory authorities vis-à-vis the State or the tasks and prerogatives of each of the entities involved in national spectrum organization, each country has constructed its own model.

It can be noted that in the majority of developing countries, spectrum management is entrusted to the entity in charge of regulating telecommunications.

Annex 1 gives examples of national spectrum management and regulatory organization.

2.1.3 Transparent management

2.1.3.1 What is transparency and why it is needed

Transparency is enshrined in the body of provisions guaranteeing that the players subject to regulations will be treated on an equal footing with other players, and will not be placed at a disadvantage in comparison to those with privileged access to information or administrations.

Transparency can be defined as practical and easy access to the rules, procedures and basic data needed to conduct business, access to the grounds for administrations’ decisions/choices, and the possibility for those potentially affected by plans to modify the regulatory environment to take part (access to information and the possibility to make proposals) in the decision-making process, in order to state their needs and defend their interests.

The possibility to contest decisions in court can also be considered an important part of the principle of transparency.

Without transparency, uncertainty about the implementation of regulations would be an overwhelming risk, and transparency is therefore often considered a prior condition for the development of trade and services. Its implementation in areas open to competition is of the utmost importance, and it can condition decisions on market involvement and investments.

Moreover, for the administrations themselves, transparency is also an effective means of regulation, for it enables decision-makers to have access to the information most relevant to their decisions.

2.1.3.2 Transparency in national spectrum management

In the field of spectrum management, one of the pivotal tasks of each administration is to define the categories of users subject to specific management, and to draw up a national frequency allocation table dividing utilization of the spectrum among the categories of users, with their related rights and obligations.

The requirement of transparency varies depending on the type of user concerned. As mentioned above, transparency is a highly desirable management method in competitive markets; in other areas, however, where confidentiality and secrecy are crucial, transparency is neither required nor desired. Indeed, even in the regulation of markets open to competition, transparency is partly limited by the right to protect public needs and trade secrets.

For example, a significant part of the spectrum is usually allocated to the government's inherent functions, such as defence, police and security. Those activities require special protection, and transparency in their management is not the rule. Qualified transparency may be applied to other activities in which security is important, such as maritime or aeronautical utilizations. However, utilization of the spectrum should benefit from transparent management, except for those cases mentioned before.

Transparency may apply in particular to the following areas:

- allocation to services, frequency planning (participation in the establishment of the relevant parts of the national frequency allocation table);
- issuance of licences, assignment to stations, notification to ITU;
- conditions for frequency sharing;
- installations/grouping of stations;
- preparation of negotiations on international treaties relating to spectrum management (in particular WRCs, which amend the RR). Indeed, although it is governments that negotiate treaties, those treaties can modify the national regulations applying to other players, who should therefore be able to take part, whenever necessary, in national preparations.

2.1.3.3 How to achieve transparent management

The prime principle underpinning transparent management is that its general framework be defined by law, thus ensuring good visibility and stability.

Furthermore, enforcement of the law and its implementing legislation may be entrusted to an entity (designated below as the Authority) that is sufficiently independent of both government and industry to ensure that decisions are taken free of any pressures from involved parties. The Authority's guaranteed independence must be set down in the law, and procedures for appealing decisions, when justified, must exist and be applicable (by government and by industry).

The relevant laws, regulations, procedures and decisions must be rendered easily accessible to the parties concerned by a variety of means (legal journals, brochures, internet sites, etc.).

In order to allow those concerned to assess the relevance of decisions in terms of the applicable laws and regulations, and to contest those decisions as required, the grounds therefore should be given whenever justified.

When plans are made to modify the regulatory environment, the parties concerned should be consulted as soon as possible. In order to facilitate their participation in the modification process, they should be provided with information on the planned modifications, the body in charge of seeing them through, the way in which contributions are to be taken into account, the timetable, etc.

Lastly, consultative commissions open to all parties (administrations, operators, entrepreneurs, users) can be established for certain standard procedures for the reciprocal exchange of information and to ensure the best solutions are found, whenever possible by consensus.

2.1.4 Economic aspects

The economic aspects of spectrum management are dealt with in the Report ITU-R SM.2012 on Economic Aspects of Spectrum (2000) and its Addendum.

The Report describes the three main avenues for financing national spectrum management, with their respective advantages and disadvantages:

- the national budget;
- the levying of charges and fees for spectrum utilization;
- the organization of auctions.

It also describes the economic approaches used to promote effective national spectrum management (assignment by comparative hearings, lotteries or auctions; transferable spectrum rights; incentive fee structures and spectrum occupancy fees).

Last but not least, the Report describes two methods of assessing the economic benefits of spectrum utilization, using:

- gross domestic product (GDP) and employment;
- consumer and producer surplus.

2.2 The linkage between international and national regulations

As in any other field, national legislation is drawn up with due regard for the State's undertakings in the framework of its international activities. When it comes to radio frequencies and associated orbits, the States' rights and obligations are governed mainly by the RR, which stipulate that those orbits and frequencies must be used rationally, efficiently and economically so that countries may have equitable access to them (see CS196).

The RR complements the Union's Constitution and Convention. The RR has international treaty status and national legislation must therefore conform to its provisions²². This is obviously an essential rule for drafting national legislation. It must nevertheless be borne in mind that the RR is reviewed at WRCs held on the average every three years. Provision must therefore be made to adapt national regulations at the same pace.

The State may be bound by other obligations in the framework of its commitments to a regional organization or under bilateral or multilateral agreements.

National regulations should cover the areas described below.

2.2.1 Allocations

Allocations are to be listed in a national frequency allocation table, which shall indicate, for each frequency band and, as required, for each of the ITU-R Regions, the authorized services with the corresponding authorized categories (according to the definitions contained in RR Article 1) and user categories. The table shall also specify user rights and obligations (such as exclusive use, sharing with equal rights or with priority, etc.).

2.2.2 Assignments

Before a station makes any use of a frequency (assignment), the users must ensure that they can act without causing interference to other uses and in conformity with prevailing regulations. This is done by means of coordination, which can be purely national, i.e. consultation with other users of the band. In some cases, coordination can imply consultation with neighbouring administrations if the stations are located in border areas or when required by the RR (the relevant criteria are set forth in RR Appendix 5).

There must be a procedure describing the different cases for coordination, the corresponding steps to take and the way in which the assignment is recorded in the national register. It must also describe the relationship between that procedure and coordination, notification and registration procedures in the MIFR (see RR Chapter III).

²² "The Member States are also bound to take the necessary steps to impose the observance of the provisions of this Constitution, the Convention and the Administrative Regulations upon operating agencies authorized by them to establish and operate telecommunications and which engage in international services or which operate stations capable of causing harmful interference to the radio services of other countries" (CS-38).

2.2.3 Authorizations (or licences)

The competent authorities grant authorizations to ensure that spectrum utilization is rational, efficient and economical. By granting an authorization, the authorities fulfill their obligations not only to their country's spectrum users but also to other administrations that could be affected by interference. The authorizations can be used to identify the source of any transmissions causing a problem and to take measures to eliminate it.

As mentioned in § 1.2.1, the RR are structured to avoid the occurrence of harmful interference. All the commitments made by ITU Member States when they sign and subsequently ratify the final acts of a WRC amount to commitments to other Member States not to cause harmful interference. The authorization (or licence) granted to a station operator is thus the legal act guaranteeing that the commitment between States is formally extended so as to become a commitment between operators. RR Article 18, which obliges States to grant a licence to any transmitting station to be operated by any private person or enterprise, is therefore the basic link between the national and international levels of spectrum management.

The rules governing authorization vary depending on whether the spectrum is to be utilized for State missions or by the private sector. In the latter case, they should permit harmonious development of the sector in a fair, transparent and non-discriminatory competitive environment.

Certain transmitting stations, the hand held terminals in particular in the mobile communication sector intended for the general public, do not require an individual authorization. This is especially true when the level of radiated power is very low or when the terminals are subject to international harmonization, as the authorization granted to the network operator implicitly covers prevention of the risk of interference. Authorizations for satellite networks and associated earth stations constitute a very special area in the relationship between international provisions and national spectrum regulations. As stated in § 1.4, a transmitting earth station on the national territory must be granted a licence to operate (except sometimes for bands that are not shared with other services), said licence implying a guarantee of compatibility with the other local uses of the frequencies concerned (possibly as a result of national or international coordination, for example in accordance with RR Nos. 9.17 or 9.17A). A satellite network notified to ITU-R by an administration must also be granted an appropriate licence to operate by that administration. The licence constitutes the legal link between the satellite network operator's rights and obligations and those of the administration towards other ITU Member States via the application of ITU-R procedures (coordination under RR 9.7). The licence guarantees *inter alia* that operation of the network will not cause harmful interference to the satellite networks notified to ITU by other Member States.

Given the growing importance of global networks, the administration granting the earth station licence is usually not the same as that granting the satellite network licence (sometimes also called the space segment licence). If a satellite network operating under a licence granted by administration A uses an earth station situated on the territory of administration B, administration B must grant a licence for the earth station alone. This is often referred to as the satellite network of country A obtaining "landing rights" in country B. The fact that certain countries do not grant separate space segment and earth station licences renders the issue of landing rights a thorny one, in particular with regard to conformity with GATS (see § 1.2.4).

2.2.4 Monitoring the spectrum

In order to guarantee that spectrum use conforms to existing regulations and the authorizations granted, there must be a spectrum monitoring system comprising fixed and mobile equipment.

That equipment is employed to check that frequencies are used in accordance with the authorizations granted. It can also be used to detect sources of interference.

The means involved are substantial and should be used in alliance whenever possible. They can be employed to conduct the international enquiries requested by ITU-R or by a foreign administration in the event of interference.

Further information may be found in the ITU-R Handbook on Spectrum Monitoring (2002).

2.2.5 Interference

The national regulations must contain measures, perhaps in the form of penalties, aimed at putting a stop to any interference caused by unauthorized use or use that does not conform to the allocation, assignment or authorization.

The administrations are advised to ensure that users registering and following up an interference complaint have to deal with a single point of contact, no matter how many users are ultimately involved. The solution should be found by means of cooperation between all the users of the spectrum concerned.

2.2.6 International representation

National spectrum management takes place within the framework established by all the international commitments made by the States globally, regionally or bilaterally. It is therefore vital that those commitments be properly reflected in national legislation and regulations. By the same token, those involved in national spectrum organization in each country are highly encouraged to be involved in and provide input to the reflection and discussions held at international level with a view to developing the global or regional regulatory and legal framework. If they are not involved, national spectrum concerns may not be reflected at international level, and one country's pertinent, innovative and original solution to a global problem may not be adopted worldwide and will in the long run become impracticable even in that country, with potentially serious economic consequences for the country and the global community.

2.3 Factors affecting legal approaches

2.3.1 Objectives, scope of spectrum management

The general objectives of spectrum management do not vary from country to country. Spectrum management must serve the national interest, promote the country's economic and social development and ensure safety of life. Those objectives are not always spelled out explicitly in the national texts.

The legal approaches to meeting those objectives do vary, however. The globalization of exchanges has not brought with it a model for spectrum management, which remains marked by national factors such as the country's geography, society, radiocommunication history and economic maturity.

It may be useful to define what spectrum management, given the variety of situations, means. Generally speaking, spectrum management is the organization of frequency band allocations between users/services and the implementation of means to ensure respect for those allocations. In some countries, only one entity has that responsibility. In other countries, it may be shared. A careful balance resides in the allotment of spectrum allocations for government and commercial purposes within one and the same country.

2.3.2 Legal framework, regulation

In some countries (France, Switzerland, etc.), the legislation regulating telecommunications network and services organizes spectrum management.

In some other countries (United Kingdom, Japan, Australia, India, Korea, etc.), there is in addition a radiocommunications act that covers all aspects of radiocommunications and often precedes telecommunication legislation.

The ITU-R Handbook on National Spectrum Management (2005) recommends the adoption of a radiocommunications act. The radio-frequency spectrum is a shared resource and its use must be legally framed, especially when market forces influence spectrum management.

Spectrum management (planning) should be a prerequisite for licences/authorizations (regulation of the telecommunications and audiovisual markets).

2.3.3 Geography, geopolitical environment

A major factor influencing the legal approach to spectrum management is without doubt the country's physical and human geography. The priorities and consequent investments and the management structure will vary depending on whether or not the country has neighbours (border coordination), is landlocked (the risk of radio link interference from ships at sea), covers a large or small area, has a high or low population density (saturation, organization of spectrum monitoring), is mountainous or covered in vegetation.

The greater the level of radio usage then the more likely it will be that the spectrum management authority will require dialogue with neighbouring countries and the international radio community.

A small country at the heart of Europe (e.g. Luxembourg) cannot have a spectrum policy that is independent of those of its neighbours. That is not the case of island countries (Australia, New Zealand) or countries covering a large area, whose border areas may be sparsely populated and have reduced economic activity and hence low frequency use. Independence, although it is the easy way out when geography permits, is however not desirable, because it limits the potential benefits of economies of scale and the capacity for interoperability associated with regional or global harmonization of frequencies.

Political developments in a region also influence the legal approach. Globalization requires enhanced regional integration.

2.3.4 Society, administrative and legal culture

Radiocommunications have not developed at the same pace everywhere. Spectrum management may remain divided in few states between telecommunications and broadcasting for historical reasons (the relative importance of broadcasting, which predate mobile uses).

The way the society is organized can also influence the legal approach to the spectrum. Federal systems tend to favour decentralized organization of spectrum management and lean towards flexibility and reactivity, whereas centralized countries guarantee a public service and favour medium and long-term planning.

2.3.5 Level of economic development

Economic development is without doubt both a decisive factor in and a result of the legal approach to spectrum management. Industrial, and in particular technological, development has an impact on the relative priorities to be taken into account in national spectrum management (future projects, standards to be disseminated, development of the national market and global expansion).

Certainly, in some countries, the spectrum is not yet the scarce resource it is elsewhere. But the preparation of frequency plans, national tables and user conditions should be given priority, because of their importance over the long term to the development of radiocommunications.

3 Conclusion

Questions on spectrum regulatory framework are of particular importance at a time when the number of wireless applications is increasing and applications intended for the general public, like mobile communications, are becoming mass-market applications worldwide.

Annex 1 contains the description of approaches to management of national spectrum management organizations.

Annex 2 contains an extract from the Handbook on National Spectrum Management, Best practices for national spectrum management.

Annex 3 contains Article VI on Domestic Regulation from the GATS.

Annex 1

Possible approaches to management of national spectrum organizations²³

This Annex gives examples of national spectrum management organizations.

France²⁴

In France, radio spectrum is considered as the State public domain which cannot be sold. The Prime Minister formally allocates frequency bands to radiocommunication services, to be managed by government departments or agencies and independent authorities. In conformity with No. 18.2 of the RR, the government (either directly or through independent authorities) delivers authorizations for the use of spectrum by private entities.

Entities involved in national spectrum organization:

- the Prime Minister;
- the Direction Générale de l'Industrie, des Technologies de l'Information et des Postes (DiGITIP) which answers to the Ministry for Economic, Financial and Industrial Affairs;
- the Agence Nationale des Fréquences (ANFR), a public administrative body;
- the administrations and authorities to which frequencies have been allocated, i.e. the governmental authorities utilizing frequencies (the Defence Department, the Department of the Interior, the Space Agency (CNES), the meteorological administration, the civil aviation administration, the ports authority, radio astronomy in the Education Department) and two independent authorities, the telecommunications regulatory authority – Autorité de Régulation des Télécommunications (ART) and the broadcasting authority – Conseil Supérieur de l'Audiovisuel (CSA).

²³ Information on spectrum management organizations can also be found on the Resolution 9 (adopted by WTDC-02) website at: http://www.itu.int/ITU-D/study_groups/SGP_2002-2006/JGRES09/Res9_Index.html (updated: 2004) with extensive answers to the Resolution 9 questionnaire on: legal or regulatory texts governing national spectrum management processes (Q.1); availability of regulations and procedures for national spectrum management (e.g. radio services, licence requirements, etc.) (Q.2); technical requirements and standards (Q.4); spectrum redeployment (Q.5); institutional organization of spectrum management (Q.16) and in the associated Report ITU-D 2/188 (September 2004).

²⁴ <http://www.arcep.fr> (10/2006) <http://www.anfr.fr> (10/2006) <http://www.telecom.gouv.fr/international/index.htm> (10/2006).

Their tasks and prerogatives are as follows:

- The Prime Minister approves the national frequency allocation table submitted by ANFR.
- DiGITIP prepares the government's policy positions on postal and telecommunication matters.
- ANFR plans, manages and monitors the utilization, including for private purposes, of frequencies in the public domain. It draws up the national frequency allocation table, and defines the French position and coordinates the action of France's representatives in international negotiations on frequencies. It also coordinates the establishment on the national territory of radio stations so as to ensure the best use of the available sites.
- The administrations and authorities to which frequencies have been allocated manage the frequencies allocated to them, in part or in whole, under the national frequency allocation table. They are full members of the ANFR Board of Directors. ART acts as the regulator for the telecommunication sector. It applies all the legal, economic and technical provisions making telecommunication activities possible. CSA manages broadcasting frequencies. It issues broadcasting licences to FM radios and private television companies. It is also the regulatory authority for terrestrial and satellite broadcasting and for cable, and for programme contents. It is also the regulatory authority for programme content.

Legislative and regulatory framework:

For telecommunications: the Post and Electronic Communications Code codifies the sector's legislative and regulatory texts, including:

- the telecommunications law of 26 July 1996, which lays the legal foundation for the creation of ART and ANFR;
- the implementing legislation on the organization and functioning of ANFR and ART.

For broadcasting:

- The law on freedom of communication of 30 September 1986 as modified and completed by further laws, the last one in August 2000.

Both legislations have been modified by the Law of 21 June 2004, relating to confidence in digital economy, and the Law of 9 July 2004, relating to electronic communications and audiovisual communication services, which implements, in particular, the elements of the European Framework Directive.

Rationale for institutional changes in spectrum management

Before the creation of ANFR in 1997, most of the work in spectrum planning was done directly between the administrations and authorities to which spectrum was allocated, leading to the absence of a trusted third party qualified in all areas of spectrum, and build-up of mistrust between the telecommunication sector, represented by the ministry in charge of telecommunications, and other ministries/authority.

This situation was especially detrimental during international negotiations, at CEPT or ITU levels.

The situation was also detrimental in the field of spectrum relocation, due to the absence of financial resources.

By creating the ANFR in 1997, the regulatory framework enabled a fully staffed (350 staff members) and financed government agency to carry out national spectrum allocation, coordination, recording planning and monitoring, and national leadership in international negotiations, as well as financing spectrum relocation.

United Kingdom

Since December 2003, radio spectrum management is one of the duties of the new media and electronic communications regulator, Ofcom²⁵, which has taken over the functions of five former regulators: the Radiocommunications Agency, the Independent Television Commission, the Radio Authority (independent sound broadcasting), the Broadcasting Standards Commission and OFTEL (telecommunication regulation).

Ofcom was set up to encourage and promote the optimal use of the radio spectrum in the interests of all citizens and stakeholders.

Entities involved in national spectrum organization:

- The Department of Trade and Industry (DTI).
- The Office of Communications (Ofcom).

Their tasks and prerogatives are as follows:

- The government, through the DTI retains the ultimate power to make decisions on the distribution of spectrum in the national interest. In practice, spectrum management functions and representation of UK in international meetings on spectrum have been devolved to Ofcom. DTI can give directions to Ofcom concerning its spectrum management functions in the interests of national security, of the safety of the public or of public health, of relations with the government of a country or territory outside the United Kingdom and for the purpose of securing compliance with international obligations of the United Kingdom.

The UK Spectrum Strategy Committee (SSC), a Cabinet Office committee with representatives from the Ministry of Defence and all other government departments with an interest in spectrum use and the development of radiocommunications, remains the supreme spectrum policy body in the UK. Ofcom plays a key role in advising the SSC and is responsible for implementing the overall UK strategy.

- Ofcom is a public corporation established by the Office of Communications Act 2002 to function independently of government as the regulator for the United Kingdom communications industries, with responsibilities across television, radio, telecommunications and wireless communications services.

Under the Communications Act 2003, Ofcom took over a number of powers enacted under previous legislation concerning telecommunications, broadcasting, national telephone numbering and the licensing of transmitting stations. At the same time, new legislative functions to regulate the market in electronic communications generally were also assigned to Ofcom to fulfil obligations under the European Union Directive 2002/21/EC. This requires the establishment of a common regulatory framework for electronic communication networks and services. Ofcom is also empowered to undertake all administrative functions associated with the use and management of civil radio spectrum.

Ofcom is governed by a Board with a non-executive Chairman and both executive and non-executive members. The Chairman and non-executive members (numbering between 3 and 6) are appointed by government. The Chief Executive of Ofcom and two members of the Ofcom Executive complete the membership of the Ofcom Board as executive members. The Ofcom Executive, headed by the Chief Executive, runs the organization and answers to the Board, whilst the work of both Board and Executive is informed by the contribution of a number of advisory bodies.

²⁵ <http://www.ofcom.org.uk>.

In relation to frequency use and spectrum management, Ofcom:

- maintains and publishes the United Kingdom Plan for Frequency Authorisation (covering the allocation of frequency bands to radiocommunication services in the United Kingdom) and maintains the National Frequency Register;
- determines the bands and frequencies available for sound and television broadcasting services, particularly in respect of the transition to digital multiplex operation;
- issues Wireless Telegraphy Act licences and grants recognized spectrum access (RSA), as appropriate, to regulate the use of stations or equipment for non-government radiocommunications;
- manages spectrum on behalf of government departments – these services do not need a licence but are subject to charges payable to Ofcom.

Legislative and regulatory framework:

- The Wireless Telegraphy Act (1949) in principle requires all radio stations and apparatus to be authorized by means of a licence or otherwise. In practice many uses of radio no longer require individual licences as more and more classes of radio equipment come under the scope of deregulation provisions (class licences, general licences, exemptions, etc.). The Act was amended in 1998 to allow auctions to be introduced as a more efficient way of regulating spectrum use.
- The Communications Act 2003 transfers the government's licensing powers under the Wireless Telegraphy Act (including the provisions for auctions and granting Radio Spectrum Access rights) to Ofcom. These are now exercised within the European Union Directive 2002/21/EC on electronic communication networks and services, under which Ofcom is required to promote competition, in particular, in relation to the provision and making available of services and facilities that are provided or made available in association with the provision of networks or electronic communications services. In this way, auctions are to be used as the preferred means to assign spectrum; granting of trading rights will help develop the market for spectrum trading; and restrictions on use of individual spectrum bands are made as light as possible.
- Ofcom also performs a key role in coordinating spectrum use at the European level through the Radio Spectrum Committee (RSC) and the Radio Spectrum Policy Group (RSPG) by virtue of powers devolved by DTI through ministerial directions to Ofcom pursuant to the Communications Act 2003.

United States²⁶

Entities involved in national spectrum organization:

- Congress.
- The National Telecommunication and Information Administration (NTIA), in particular its Office of Spectrum Management (OSM) and its Interdepartment Radio Advisor Committee (IRAC).
- The Federal Communications Commission (FCC).

²⁶ <http://www.ntia.doc.gov>, <http://www.fcc.gov> (11/2003).

Their tasks and prerogatives are as follows:

- Congress issues policy guidelines.
- NTIA, established by an Executive Order in 1978 as an Executive Branch agency located within the United States Department of Commerce, is charged with managing the federal government's use of the radio spectrum. NTIA is the principal telecommunications policy advisor to the President. It conducts studies, on behalf of the Executive Branch, with a view to ITU WRCs.

NTIA:

- develops long-range spectrum plans to meet future federal government spectrum requirements and draft policies for efficient utilization of the spectrum in coordination with FCC;
- develops plans for managing radiocommunications during emergencies;
- coordinates and registers, through the FCC, federal government satellite networks internationally;
- satisfies the spectrum needs of the federal agencies; provides spectrum certification for new federal agency radiocommunication systems;
- performs the necessary engineering analysis for evaluating and planning spectrum use;
- provides the necessary automated information technology capability to perform these activities.

NTIA's OSM has the responsibility for day-to-day spectrum management decisions and for developing proposals for spectrum management policies. It is the ultimate authority in all spectrum management decisions for the federal government. Appeals between federal agencies on frequency assignment decisions are resolved by the NTIA's Office of Management and Budget (OMB).

NTIA's IRAC, established in 1922, with representation from 20 federal agencies and liaison from the FCC, gives advice to NTIA on the development of spectrum policy and procedural matters, federal government positions on treaty issues affecting United States use of the spectrum, and recommendations for conflict resolution.

IRAC has six subcommittees (Spectrum Planning, Technical, Radio Conference, Emergency Planning, Frequency Assignment, and Space Systems) chaired by NTIA.

- FCC is an independent United States government agency directly responsible to Congress. The FCC was established by the Communications Act of 1934 and is charged with regulating interstate and international communications by radio, television, wire, satellite and cable. Five Commissioners direct FCC. The FCC staff is organized by function in six bureaus having the responsibility to carry out the day-to-day authority and decisions of the FCC.

Legislative and regulatory framework:

- The 1934 Communications Act is the basic law governing wire line communications and radiocommunications within the United States and between the United States and other countries.
- OBRA (Omnibus Budget Reconciliation Act), voted by Congress in 1993, authorizes FCC to auction spectrum.
- The 1996 Telecommunications Act.

Canada

Entities involved in national spectrum organization:

- Industry Canada
- Canadian Heritage
- Canadian Radio-television and Telecommunications Commission (CRTC).

Their tasks and prerogatives are as follows:

- Policies and Regulations for Radiocommunications are the prerogative of Industry Canada²⁷.
- Policies for Telecommunications and Broadcasting are developed together by Industry Canada and Canadian Heritage. These policies and implementation issues focus on:
 - interconnection and interoperability of network facilities;
 - measures to support Canadian cultural content services;
 - the transition to fair competition in the provision of all telecommunications and broadcasting services.
- Regulations for Telecommunications and Broadcasting are the prerogative of the CRTC²⁸ under the Telecommunications Act and the Broadcasting Act. The CRTC is an independent regulatory body that is required to use its powers to implement policy objectives and directions and to ensure that rates are just and reasonable.

Regulatory and legislative framework:

- Telecommunications Act 1998 has the key policy objectives for the orderly development of a telecommunications system that provides affordable and reliable services in all regions of Canada, both urban and rural areas. The Act legislates Canadian ownership of the infrastructure and promotes the use of Canadian transmission facilities. There is enhanced efficiency and competitiveness of Canadian industry with increased reliance on market forces and efficient and effective regulations are provided where required. The Act contributes to the protection of the privacy of persons. There is encouragement of research, development and innovation. Canadian obligations under the WTO Agreement are included in amendments to the Telecommunications Act.
- Radiocommunication Act 1996 ensures the orderly establishment and modification of radio stations and the efficient operation and development of radiocommunication. This includes planning the allocation and the use of the spectrum. The Act legislates the establishment of technical requirements and technical standards in relation to radio apparatus, interference-causing equipment and radiosensitive equipment. The Act empowers the Minister to issue orders to cease or modify operation of this equipment so to operate without causing or being affected by harmful interference.
- Radiocommunication Regulations 2002 prescribes the terms and conditions applicable to radio services, radio operators, broadcast undertakings with regard to licences, technical acceptance certificates, and fees.
- Broadcasting Act 1996 defines Canadian ownership and the Canadian content of broadcasting in Canada. It also relates the powers of the Commission (CRTC) in relation to broadcasting.

²⁷ <http://strategis.gc.ca/spectrum>.

²⁸ <http://www.crtc.gc.ca/>.

Depending on the aspect of national spectrum organization reference to the Competition Act or other applicable Acts are necessary to complete the perspective within the context of the integrated legislative approach in Canada. Responsibilities are outlined in the powers of the Minister of Industry and of the Governor in Council, as set out in the Department of Industry Act, the Radiocommunication Act, the Broadcasting Act, and the Telecommunications Act. These responsibilities are undertaken to ensure the orderly development of telecommunications infrastructure and services in Canada, and to obtain and provide access to the radio spectrum and regulate its use.

New Zealand²⁹

Entities involved in national spectrum organization:

- the Minister of Communications;
- the Ministry of Economic Development. Policy development and spectrum planning are undertaken in the Resources and Networks Branch, with Licensing, Compliance and Registry functions being undertaken in the Radio Spectrum Management Group of the Business Services Branch.

Their tasks and prerogatives are as follows:

- The Minister provides formal notices of Government policy and any associated directions in regard to granting licences under the legislation.
- The Resources and Networks Branch develop policy advice and recommendations for Government and undertakes international and national planning activities associated with spectrum utilization and auction allocations. Other parts of the Branch provide policy advice on telecommunications and ICT policy.

The Radio Spectrum Management Group of the Business Services Branch undertakes licensing of users in those frequency bands retained under government management and compliance activity in all frequency bands. The Branch also maintains a public register of radio-frequency licences issued³⁰.

Legislative and regulatory framework:

- The 1989 Radiocommunications Act provides the overall regime for spectrum management in New Zealand. Spectrum is managed in one of two distinct frameworks, either an administrative framework or a property rights framework. The administrative framework (termed radio licences) is operated solely by the Ministry and typically has annual licences which are renewed on payment of an administrative fee. The property rights framework allows for a management right to be created over a specific frequency range, which can be either held by the Ministry or allocated commercially to private interests. The holder of the management right can issue licences (termed spectrum licences) as they deem appropriate. Management rights and spectrum licences have legal certainty, are fully tradable, and are established for periods of up to 20 years. When spectrum is managed by the Ministry, licences are typically allocated by auction. Entry into markets such as broadcasting and some telecommunications services is only limited by acquisition of the necessary spectrum licences. The Act is accompanied by the Radiocommunications Regulations, which details the administrative framework, provides for control of non-radio “interfering equipment” and sets the fees payable to the government.

²⁹ <http://www.med.govt.nz>.

³⁰ <http://rfr.med.govt.nz>.

Associated legislation is the Telecommunications Act, the Broadcasting Act and the Commerce Act.

Cameroon

Entities involved in national spectrum organization:

- the Ministry of Posts and Telecommunications;
- the Inter-Ministerial Frequency Band Allocation Board (Organe Interministériel d'Attribution des Bandes de Fréquences) (to be set up) under the supervisory authority of the Ministry of Posts and Telecommunications;
- the Telecommunication Regulatory Board (TRB) (or Agence de Régulation des Télécommunications (ART)), a public corporation with independent legal status and financial and decision-making autonomy;
- the Ministry of Communications (MINCOM).

Their tasks and prerogatives are as follows:

- The Ministry in charge of Telecommunications is responsible for defining policy and drafting sector rules at the level of legislation. Conditions of joint management of private radio electricity by the Ministry of Post and Telecommunications, the Ministry in charge of Defence and the Ministry in charge of territorial administration are defined in the Law 67/LF/20.
- The IFMB will be charged with assigning segments of the radiocommunications frequency band to the various assignees in accordance with the provisions of Article 5 of Radio Regulation and with specific national needs; it can also prescribe any technical provisions required to iron out any interference between different services.
- The TRB manages the frequencies allocated to the telecommunications sector including assignment and control.
- The Ministry of Communications follows up the planning of radio frequencies allocated to the various public and private radio and television broadcasting stations; it monitors sources of scrambling and interference for all radio and television transmitters; it is responsible for issuing operator's licences to audiovisual sector operators stating the technical conditions for network use and contribution to the frequency management costs: in liaison with the technical services in charge of telecommunications, it carries out compliance monitoring operations on equipment.

Legislative and regulatory framework:

- The Federal Law 67/LF/20 of 12 June 1967 regulating private radio electricity and fixing the charges corresponding thereto.
- The Law No. 98/14 of 14 July 1998 which created the TRB and the IFMB, and its implementing instruments signed by the Head of State and the Decree N°98/197 of 8 September 1998) on the organization and functioning of the TRB.
- The decrees on the rules governing the authorization to operate telecommunications networks (Decree N°2001/830/PM of 19 September 2001) and on the rules governing the granting of authorizations to provide telecommunications services (Decree N°2001/831/PM of 19 September 2001).
- The Law No. 90/52 of 19 December on the freedom of social communication and the Decree N°96/260 of 19 October 1996 and Decree N°2000/158 of 3 April 2000 which all define the powers of the Ministry of Communication with regard to spectrum management.

Republic of Korea³¹

The Korea Communications Commission (KCC) is in charge of the spectrum management based on the Radio Wave Act which was established in 1961. The Act contains provisions for efficient use of radio-frequency spectrum and relating organization for spectrum management.

Entities involved in national spectrum organizations:

- Korea Communications Commission (KCC);
- Radio Research Agency (RRA);
- Central Radio Management Office (CRMO) and its Regional Radio Management Offices;
- Korean Radio Promotion Agency (KORPA); and
- Authorized Testing Laboratory (private company).

Their tasks and prerogatives are as follows:

- KCC is responsible for communication and broadcasting policy including spectrum allocation, frequency assignment criteria, technical criteria. It has also final responsibility on certification of information and communication technology devices, on licensing, inspection and monitoring of radio stations, on billing and collecting spectrum use fee, on licensing of spectrum and on promotion of radio industry.
- RRA is in charge of developing technical criteria and standards for information and communication technology and certification of the information and communication equipments on behalf of KCC.
- CRMO and RRMO are on behalf of KCC supervising and managing licences (granting, modification, prescription, renewals, etc.), including inspection of radio stations that belong to government organization. CRMO and SRMC are also in charge of monitoring the illegal use of radio frequency including international cooperation on spectrum monitoring and surveillance of illegal radio device on the market and radio stations of which the emissions are not in compliance with technical criteria.
- KORPA established under the provisions of the Radio Wave Act is an independent organization doing the roll of inspection of radio stations except those belong to government organizations.
- Testing Laboratories are private companies that are authorized to perform the conformity assessment of information and communication technology devices on behalf of KCC. They are assessed and designated by RRA on behalf of KCC.

Legislative and regulatory framework:

- The 1961 Radio Wave Act establishes the regulatory framework for efficient use of radio-frequency spectrum, and is supported by its Presidential Decree and KCC Notifications.
- The 1983 Telecommunication Basic Act provides the basic guidance on telecommunications, and is supported by its Presidential Decree and KCC Notifications.
- The 2000 Broadcasting Act regulates the licensing of Broadcasting Service Provider and Program Providers and is supported by its Presidential Decree.

³¹ <http://www.kcc.go.kr>.

Switzerland

Entities involved in national spectrum organization:

- Federal Department for Environment, Transport, Energy and Communication.
- Federal Communication Commission (ComCom).
- Federal Office for Communications (OFCOM).

Their tasks and prerogatives are as follows:

- The Federal Department for Environment, Transport, Energy and Communication delivers long lasting radio and broadcasting concessions.
- The Federal Communication Commission approves the National Frequency Allocation Plan. It also delivers telecommunication concessions for operating public networks and for providing telecommunication services to the public.
- Federal Office for Communications is responsible for the management of civilian frequencies, the monitoring and licence management (delivering, modifying, prescribing, renewing ...).

Legislative and regulatory framework:

- The Telecommunication Law of 1997 establishes the regulatory framework for telecommunications.
- Federal Law of 1991 on Radio and Broadcasting defines the regulations for providing broadcasting services.

Jordan (Hashemite Kingdom of)

Entities involved in national Spectrum organization:

- Ministry of Communications and Information Technology (MoC&IT).
- Telecommunications Regulatory Commission (TRC).

Their tasks and prerogatives are as follows:

The Ministry (MoC&IT):

- prepare, the general policy of the sector;
- follow up, the implementations, of the kingdom's commitments, in international treaties;
- to provide the necessary facilities to allow the TRC and the designated members of the arms forces and security services to prepare the national plan for frequency assignment and the national register of frequencies, to maintain these in the Ministry, and prepare procedures to ensure optimal use of radio frequencies and to prevent harmful interference between frequencies assigned for civilian and military uses;
- to oversee the representation of the kingdom, before international organizations, unions, and commissions concerned with the sector.

The Commission (TRC)

- prepare and adopt the terms and conditions and criteria for the granting of licenses for the use of radio-frequency spectrum;
- manage the use of the radio-frequency spectrum (including broadcasting) whether terrestrial, maritime, aviation or satellite based, including preparing and maintaining the national table of frequency allocations;
- preparing the national plan for frequency assignment and national register of frequencies in coordination with armed forces and security agencies;

- maintaining the civilian portion of the national plan for frequency assignment and the national register of frequencies, and making it publicly available;
- set plans by a “Consultative Committee for frequencies” in TRC (five selected members) for the allocations and assignment of radio frequencies;
- monitor the use of the radio frequencies assigned to licensees;
- participate in the representation of the Kingdom in meetings, conferences, delegations, workshops and other international gathering having to do with telecommunications and information technology.

Legislative and regulatory framework:

- 1) Until 1995 the incumbent operator reporting to the Minister, granted spectrum licenses.
- 2) Telecom law came into force in 1995, established the regulatory framework for telecommunications sector, separating operation from Regulatory Authority and Policy makers, and established TRC with its Board of Directors headed by the Minister.
- 3) Telecom law has been amended in 2002, affirming an independent TRC with its Board of Commissioners (4-year term) headed by a Chairman, directly reporting to the Prime Minister.

Brazil³²

The Entity involved in national spectrum organization in Brazil is the National Telecommunications Agency (Anatel).

Anatel, an independent government agency, acts as the regulator for the telecommunication sector, concerning the legal, economic and technical aspects to ensure the continuity and expansion of telecommunication services throughout the country. Anatel has 27 local offices (one in each capital of State) forming a decentralized structure to grant telecommunication services authorization, radio frequency authorization and station licenses as well as inspection and enforcement the accomplishing of the rules.

Anatel tasks and prerogatives are as follows:

- management of the spectrum (including the organization of the national allocation table) and the station license issues (granting, modification, prescription, renewals, etc.);
- management of the military spectrum in coordination with the Ministry of Defense;
- definition of spectrum for safety and security, in coordination with agencies related to these issues;
- working out, implementation and enforcement of rules and regulation related to the telecommunication services;
- inspection and monitoring of radio stations;
- solving problems of interference in national and international basis (border cases);
- granting telecommunication service concessions or authorization, except for broadcasting service;
- granting technical certification of telecommunication equipment;
- working out, implementation and enforcement of broadcasting technical regulations and inspection of broadcasting radio stations;

³² <http://www.anatel.gov.br> (11/2003).

- representation of the Brazilian Administration in international organizations, unions and commissions concerned with the telecommunication sector.

Legislative and regulatory framework:

- The 1997 General Law of Telecommunications (Law No. 9472, 16 July 1997) establishes the regulatory framework for telecommunications and the creation of Anatel.

In Brazil, before the Law No. 9472, of 1997, the authorization to provide telecommunication services and to make use of radio frequencies were associated and given in the same act. After that, a user interested in the use of radio frequencies has to have, firstly, an authorization for the telecommunication service, and then an authorization for the use of radio frequency. The mentioned authorizations are still associated but independent. Sometimes, mainly in the cases where the execution of the telecommunication service is not possible without the associated radio frequency, both the authorizations are given in the same act. On the other hand, telecommunication services that uses other technical resources besides radio frequencies like Public Switched Telephony Network – PSTN, there is one authorization for the telecommunication service and another one for the use of the frequency that is given for each new license for transmitter station.

There are two principles that, nowadays, are encouraged by the Brazilian Administration: Competition and Universalization. Competition means to have, at least, two companies in the country providing communication services, attending to the users with quality and at reasonable prices. Universalization is a way to ensure access to communication services to all the population and institutions of public interests, anywhere and independent of the social and economical situation of the user.

Other applicable Acts could be necessary to complete the perspective within the context of the integrated legislative approach in Brazil, mainly the legislation related to the defense of competition or the economic order (as the rules stated by the Brazilian Administrative Council of Economic Defense (CADE), and the Bureau of Economic Development (SDE).

The mentioned structure of Anatel as well as its prerogatives is being object of discussion by the new Brazilian Federal Government. It is intended to propose a modification in the tasks of the Agency by the alteration of the General Law of Telecommunications (Law No. 9472, of 1997) soon.

India

The Entity involved in national spectrum organization in India is the Wireless Planning & Coordination Wing in the Department of Telecommunications of the Ministry of Communications & Information Technology³³.

The Wireless Planning & Coordination (WPC) Wing of the Ministry of Communications & I.T., created in 1952, is the national radio regulatory authority responsible for frequency spectrum management, including licensing and caters for the needs of all wireless users in the country, government or private, security or non-security. It is also the national nodal agency for all matters related to ITU and the Asia Pacific Telecommunity (APT) and is responsible for treaty obligations on behalf of the Government of India. It also exercises the statutory functions of the Central Government and issues licenses to establish, maintain and operate wireless stations as well as possess, develop and deal in wireless equipment in the country.

The Wireless Monitoring Organization (WMO), with headquarters in New Delhi, is the field organization of WPC Wing for radio monitoring. It monitors the radio spectrum to ensure its

³³ <http://www.wpc.dot.gov.in>.

harmonious use. It has monitoring stations of varying capabilities and coverage at 22 locations, including one satellite monitoring facility, and operates a training centre in New Delhi.

Legislative and regulatory framework

The Indian legislative and regulatory framework to govern wireless licences involves the following Acts and the Rules framed there under:

Acts

- The Indian Telegraph Act, 1885 as amended from time to time.
- The Indian Wireless Telegraphy Act, 1933 as amended from time to time.

Rules

Some of the Rules framed under these Acts are:

- Indian Wireless Telegraphy (Experimental Service) Rules, 1962.
- Indian Wireless Telegraphy (Possession) Rules, 1965.
- Indian Wireless Telegraphs Rules, 1973.
- Indian Wireless Telegraphs (Amateur Service) Rules, 1978.
- Electronic Gadgets (Exemption from licensing requirements) Rules, 1988.
- Radio, Television and Videocassette recorder sets (Exemption from licensing requirements) Amendment Rules, 2001.

The Government of India recognizes that provision of world-class telecommunications infrastructure and information is the key to rapid economic and social development of the country. It is critical not only for the development of the Information Technology industry, but also has widespread ramifications on the entire economy of the country. It is also anticipated that going forward, a major part of the GDP of the country would be contributed by this sector. Accordingly, it is of vital importance to the country that there be a comprehensive and forward looking telecommunications policy which creates an enabling framework for development of this industry. In pursuance of New Telecom Policy, 1999, the National Frequency Allocation Plan – 2000 (NFAP-2000) was evolved and made effective from 01.01.2000, which formed the basis for development, manufacturing and spectrum utilization activities in the country.

At the time of formulation of NFAP-2000, it was recognized that there will be need to review the NFAP generally every two years in line with the Radio Regulations of the International Telecommunication Union (ITU) in order to cater to newly emerging technologies as well as to ensure equitable and optimum utilization of the scarce limited natural resource of radio-frequency spectrum. Accordingly, NFAP-2000 has been revised and new National Frequency Allocation Plan-2002 (NFAP-2002) has been evolved within the overall framework of the ITU, taking into account spectrum requirements of the government as well as private sector.

The process of review of the NFAP-2002 has been initiated in view of the recent development of technology and its applications and the decisions of WRC-03.

China

1 Spectrum management organizations and their duties

Ministry of Information Industry (MII) is the national authority in charge of spectrum management in China. Under the direct supervision of provincial governments and professional guidance of MII, radio regulatory agencies at provincial level are responsible for spectrum management within their respective jurisdictions. Radio Regulatory Department (RRD) of MII takes the responsibility of routine management of national spectrum.

1.1 Duties of RRD

- To formulate the principles, policies and administrative regulations for spectrum management.
- To establish rules and common standards for spectrum management.
- To plan radio-frequency spectrum and exploit radio-frequency resource rationally.
- To be responsible for the assignment and regulation of the radio-frequency resources.
- To be responsible for management of radio stations.
- To be responsible for radio monitoring.
- To coordinate affairs concerning the radio interferences and maintain the order of radiocommunications.
- To execute the radiocommunication traffic control according to laws concerned.
- To be responsible for satellite coordination.
- To attend various international conferences and take charge of foreign-related matters for radio management under authorization.

1.2 Duties of radio regulatory agencies at provincial level

- To implement the principles, policies, regulations and rules for spectrum management.
- To formulate specific rules and regulations applicable to that area concerned.
- To examine, under their respective authority of examination and approval, the sites of the radio stations to be built and their distribution as a whole, assign frequencies and call signs, and issue licenses to radio stations.
- To undertake radio monitoring within their respective jurisdiction.

2 Legislative and regulatory framework

The Radio Regulations of the People's Republic of China, which were issued by the State Council in 1993, is the main legal guidance for spectrum management in China. The main contents of these Regulations include:

- 1) Major principles of radio management in China such as unified leadership and planning with managerial work divided among radio regulatory agencies of different levels with responsibilities delegated to them; the radio-frequency spectrum owned by the state and the central government planning its use in a centralized manner, exploiting it rationally, managing it scientifically and providing frequencies on a chargeable basis.
- 2) Responsibilities of radio regulatory agencies at different levels and how these agencies cooperate with each other.
- 3) Requirements for operating radio stations and procedures on how to apply for station licenses.
- 4) Duties and procedures for regulatory agencies on how to allocate and allot radio frequency and how to reduce frequency interference.
- 5) Frequency requirements, band requirements and other technical requirements for development, manufacture, sale and importation of radio transmission equipments.
- 6) Duties and procedures for radio regulatory agencies in radio monitoring and supervision.
- 7) Categories of illegal actions involved with spectrum use consequent punishments.

The Provisions on Frequency Allocations of the People's Republic of China, which were issued by MII in 2001 according to the Radio Regulations of ITU (Edition of 1998), the WRC-2000 Final Acts and current situation of radio service development in China, is playing a very important role in frequency management. These Provisions stipulate in detail the terms and definitions for spectrum management, categories of radio services and allocation, the Table of Frequency Allocations, footnotes for frequency allocations of ITU and footnotes for frequency allocations of China. Development, manufacture, importation, sale, test and operation of radio equipments should observe these provisions and regard these provisions as basic guidance for selecting and using frequencies.

Two laws with status higher than the Radio Regulations of the People's Republic of China and the Provisions on Frequency Allocations of the People's Republic of China are the Crime Law of the People's Republic of China and the Law on Security Administration Punishment of the People's Republic of China. According to the Crime Law, whoever illegally uses a radio station or occupies frequency without authorization and causing serious consequence is to be sentenced to imprisonment, criminal detention or fine. According to the Law on Security Administration Punishment, whoever affects the normal operation of radio services or causes harmful interference to radio stations is to be sentenced to administrative detention. Those 2 laws are very necessary and important in maintaining normal order of frequency use and operation of radio services in China.

United Arab Emirates

The Federal decree by Law No. 3 of 2003 provides, among others, the legal regulatory framework for the spectrum management. The General Authority for regulating the Telecommunication sector (TRA) is an independent public authority. The Authority is the competent body to oversee the telecommunications sector including spectrum management and has the power to issue regulations, orders, resolutions and procedures among others in relation to the radio spectrum including the allocation, re-allocation and use thereof.

The Authority through a coordination committee representing different government departments involved in spectrum has developed and issued the National Spectrum Plan and table of frequency allocation available at its website (www.tra.ae). The Authority also promulgates the regulatory instruments (policies, regulations and procedures, etc.) to further the spectrum management in an efficient manner.

Annex 2

Extract from the Handbook on National Spectrum Management Best practices for national spectrum management

Introduction

With due regard to the ITU Constitution and Convention, this Annex addresses Best Practices for national spectrum management activities (Annex 2 of National Spectrum management handbook 2005). International practices are not included. However, some of the Best Practices contained below are intended to interface with, or transition to international practices, e.g., those relating either to collaboration with colleagues in other countries, or to coordination, such as that which would occur at a bilateral or multilateral consultation preceding a World Radiocommunication Conference, or at an international satellite coordination meeting. These practices are further intended to harmonize global spectrum management policies, to the extent practicable, by harmonizing practices among national administrations.

Practices:

- 1) Establishing and maintaining a national spectrum management organization, either independent or part of the telecommunication regulatory authority responsible for managing the radio spectrum in the public interest.
- 2) Promoting transparent, fair, economically efficient, and effective spectrum management policies, i.e., regulating the efficient and adequate use of the spectrum, taking into due account the need to avoid harmful interference and the possibility of imposing technical restrictions in order to safeguard the public interest.
- 3) Making public, wherever practicable, national frequency allocation plans and frequency assignment data to encourage openness, and to facilitate development of new radio systems, i.e., carrying out public consultations on proposed changes to national frequency allocation plans and on spectrum management decisions likely to affect service providers, to allow interested parties to participate in the decision-making process.
- 4) Maintaining a stable decision-making process that permits consideration of the public interest in managing the radio frequency spectrum, i.e., providing legal certainty by having fair and transparent processes for granting licenses for the use of spectrum, using competitive mechanisms, when necessary.
- 5) Providing in the national process, in special cases where adequately justified, for exceptions or waivers to spectrum management decisions.
- 6) Having a process for reconsideration of spectrum management decisions.
- 7) Minimizing unnecessary regulations.
- 8) Encouraging radiocommunication policies that lead to flexible spectrum use, to the extent practicable, so as to allow for the evolution of services³⁴ and technologies using clearly-defined methods, i.e., (a) eliminating regulatory barriers and allocating frequencies in a manner to facilitate entry into the market of new competitors, (b) encouraging efficiency in the use of spectrum by reducing or removing unnecessary restrictions on spectrum use, thereby encouraging competition and bringing benefits to consumers, and (c) promoting innovation and the introduction of new radio applications and technologies.
- 9) Assuring open and fair competition in the marketplaces for equipment and services, and removing any barriers that arise to open and fair competition.
- 10) Harmonizing, as far as practicable, effective domestic and international spectrum policies, including of radio-frequency use and, for space services, for any associated orbital position in the geostationary-satellite orbit or of any associated characteristics of satellites in other orbits.
- 11) Working in collaboration with regional and other international colleagues to develop coordinated regulatory practices, i.e., working in collaboration with regulatory authorities of other regions and countries to avoid harmful interference.
- 12) Removing any regulatory barriers to free circulation and global roaming of mobile terminals and similar radiocommunication equipment.
- 13) Using internationally recommended data formats and data elements for exchange of data and coordination purposes, e.g., as in the Radio Regulations Appendix 4, and in the ITU Radiocommunication Data Dictionary (Recommendation ITU-R SM.1413).

³⁴ Whenever the term “services” is used in this Handbook, it means applications and recognized radiocommunication services.

- 14) Using “milestone” management steps and phases to monitor and control lengthy radiocommunication system implementation.
- 15) Adopting decisions that are technologically neutral and which allow for evolution to new radio applications.
- 16) Facilitating timely introduction of appropriate new applications and technology while protecting existing services from harmful interference including, when appropriate, the provision of a mechanism to allow compensation for systems that must redeploy for new spectrum needs.
- 17) Considering effective policies to mitigate harm to users of existing services when reallocating spectrum.
- 18) Where spectrum is scarce, promoting spectrum sharing using available techniques (frequency, temporal, spatial, modulation coding, processing, etc.), including using interference mitigation techniques and economic incentives, to the extent practicable.
- 19) Using enforcement mechanisms, as appropriate, i.e., applying sanctions for non-compliance with obligations and for inefficient use of radio frequency spectrum under relevant appeal processes.
- 20) Utilizing regional and international standards whenever possible, and where appropriate, reflecting them in national standards.
- 21) Relying to the extent possible on industry standards including those that are included in ITU Recommendations, in lieu of national regulations.

Annex 3

GATS: Article VI Domestic Regulation

1 In sectors where specific commitments are undertaken, each Member shall ensure that all measures of general application affecting trade in services are administered in a reasonable, objective and impartial manner.

- 2**
- a) Each Member shall maintain or institute as soon as practicable judicial, arbitral or administrative tribunals or procedures which provide, at the request of an affected service supplier, for the prompt review of, and where justified, appropriate remedies for, administrative decisions affecting trade in services. Where such procedures are not independent of the agency entrusted with the administrative decision concerned, the Member shall ensure that the procedures in fact provide for an objective and impartial review.
 - b) The provisions of a) shall not be construed to require a Member to institute such tribunals or procedures where this would be inconsistent with its constitutional structure or the nature of its legal system.

3 Where authorization is required for the supply of a service on which a specific commitment has been made, the competent authorities of a Member shall, within a reasonable period of time after the submission of an application considered complete under domestic laws and regulations, inform the applicant of the decision concerning the application. At the request of the applicant, the competent authorities of the Member shall provide, without undue delay, information concerning the status of the application.

4 With a view to ensuring that measures relating to qualification requirements and procedures, technical standards and licensing requirements do not constitute unnecessary barriers to trade in services, the Council for Trade in Services shall, through appropriate bodies it may establish, develop any necessary disciplines.

Such disciplines shall aim to ensure that such requirements are, *inter alia*:

- a) based on objective and transparent criteria, such as competence and the ability to supply the service;
- b) not more burdensome than necessary to ensure the quality of the service;
- c) in the case of licensing procedures, not in themselves a restriction on the supply of the service.

5 a) In sectors in which a Member has undertaken specific commitments, pending the entry into force of disciplines developed in these sectors pursuant to § 4, the Member shall not apply licensing and qualification requirements and technical standards that nullify or impair such specific commitments in a manner which:

- i) does not comply with the criteria outlined in 4a), 4b) or 4c); and
 - ii) could not reasonably have been expected of that Member at the time the specific commitments in those sectors were made.
- b) In determining whether a Member is in conformity with the obligation under 5a), account shall be taken of international standards of relevant international organizations applied by that Member.

6 In sectors where specific commitments regarding professional services are undertaken, each Member shall provide for adequate procedures to verify the competence of professionals of any other Member.
