Part II

International law of space applications
Regulation of telecommunications by satellites

ITU and space services

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1 Introduction

Twenty-fifteen marked the hundred and fiftieth anniversary of the creation of the ITU. The ITU is the UN specialized agency in charge of telecommunications and Information Communication Technology (ICT), and is currently comprised of 193 Member States as well as over 800 Sector Members, Associates, and Academia Members from the telecommunication and ICT sectors. Following review by the Member States in 1989, versions of the CS and CV

were approved in 1992 at the additional PP held in Geneva. Together with the Radio Regulations, and amended by subsequent plenipotentiary conferences, these three instruments currently comprise the entire ITU regulatory regime. The RR are also a binding international treaty according to Article 31 of the CS. The primary purposes of the ITU are to promote cooperation and participation in the development of telecommunication services and associated technologies to bring their benefits to people worldwide. Along with allocation of spectrum and allotment of frequencies and orbital positions, the objectives of the organization are to harmonize and standardize telecommunications practices and eliminate harmful interference with those activities.

The CS, CV, and RR contain the main principles and lay down the specific regulations governing the following major elements:

- frequency spectrum allocations to different categories of radiocommunication services;
- rights and obligations of Member administrations in obtaining access to the spectrum/orbit resources;
- international recognition of these rights by recording frequency assignments and, as appropriate, orbital information for a space station onboard a geostationary-satellite or for space station(s) onboard non-geostationary satellite(s), used or intended to be used in the MIFR or by their conformity, where appropriate, with a plan.

The ITU grants international recognition, a level of protection conditioned by the provisions of the RR and procedures to detect and to eliminate harmful interference for registered assignments in the MIFR. The ITU also promotes the rational, efficient, economic, and equitable use of the radio frequency and orbital positions, which are limited natural resources and, as such, must be available for use by all Member States. In this regard, the ITU gives special consideration to the future use of these resources by developing countries.

The fact that the ITU Constitution and Convention and the Radio Regulations that complement them are intergovernmental treaties ratified by governments – means that those governments undertake:

- to apply the provisions in their countries; and
- to adopt adequate national legislation that includes, as the basic minimum, the essential provisions of this international treaty.

The RR are nevertheless oriented mainly towards matters of a global or regional character, and in many areas offer scope for making special arrangements on a bilateral or multilateral basis.

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3 ITU Constitution, supra note 3, art 1.
4 Ibid., art 2.
7 Ibid., art 6.
2 Major principles

In the process of establishing the ITU’s space-related regulations, emphasis was laid from the outset on efficient, rational and cost-effective utilization of limited resources. This concept was implemented through a “first-come, first-served” procedure. This procedure (“coordination before use”) is based on the principle that the right to use orbital and spectrum resources for a satellite network or system is acquired through negotiations with the administrations concerned by actual usage of the same portion of the spectrum and orbital resource. If applied correctly (i.e. To cover genuine requirements), the procedure offers a means of achieving efficient spectrum/orbit management; it serves to fill the gaps in the orbit(s) as needs arise. On the basis of the RR, and in the frequency bands where this concept is applied, Member administrations designate the volume of orbit/spectrum resources that are actually required to satisfy their actual requirements. It then falls to the national administrations to assign frequencies and orbital requirements, to apply the appropriate procedures (international coordination and recording) for the space segment and Earth stations of their (governmental, scientific, public and private) networks, and to assume continuing responsibility for the networks. The progressive exploitation of the orbit/frequency resources and the resulting likelihood of congestion of the geostationary-satellite orbit prompted ITU Member countries to consider more and more seriously the question of equitable access in respect of the orbit/spectrum resources. This resulted in the establishment (and introduction into the ITU regulatory regime) of frequency/orbital position plans in which a certain amount of frequency spectrum is set aside for future use by all countries, particularly those which are not in a position, at present, to make use of these resources. Such plans govern a considerable part of the frequency bands available for the space communication services.

During the last 60 years, the regulatory framework has been constantly adapted to changing circumstances and has achieved the necessary flexibility in satisfying the two major, but not always compatible, requirements of efficiency and equity. With the dramatic development in telecommunication services, increasing demand for spectrum/orbit usage for practically all space communication services has been observed. This led the PP held in Kyoto in 1994 to call in its Resolution 18 for a new in-depth review of the ITU spectrum/orbit resource allocation procedures, the results of which were considered and reviewed by WRCs.

3 The Structure and Regulatory Regime of the ITU

3.1 ITU overview

The Membership of the ITU is based on the principle of universality. Sector, Associate, and Academia Members may comprise different representatives from recognized operating agencies such as scientific or industrial organizations and financial or development institutions, which are approved by the Member State concerned. Additionally, other entities dealing with telecommunication matters which are approved by the relevant Member State may also become Sector-Associate-Academia Members. Finally, regional and other international telecommunication, standardization, financial or development organizations can apply for this type of ITU Membership as well. Although Sector Members cannot vote at ITU meetings,
they have been granted the right to fully participate in the activities of the Sector of which they are members subject to specific provisions of the Constitution and the Convention.\footnote{Ibid., art 3, number 3.}

Membership in the ITU is not free, and Member States must contribute funds to pay the Union’s expenses. Both Member States and Sector Members can, however, choose their class of contribution. The scale of contributions is determined by Article 28 of the Constitution.

Both the Constitution and the Convention may be amended by a proposal by any Member State. The decision to amend them is then taken at the PP. RR can only be amended by a WRC, which must respect the CS and the CV.

The RR aim to fulfill the purposes of the Union, and specifically have the following objectives:\footnote{RR, \textit{supra} note 6, Preamble.}

- to facilitate equitable access to and rational use of the natural resources of the radio-frequency spectrum and the geostationary-satellite orbits;
- to ensure the availability and protection from harmful interference of the frequencies provided for distress and safety purposes;
- to assist in the prevention and resolution of cases of harmful interference between the radio services of different administrations;
- to facilitate the efficient and effective operation of all radiocommunication services; and
- to provide for and, when necessary regulate new applications of radiocommunication technology.

\subsection*{3.2 Dispute resolution}

In cases involving a dispute arising from the interpretation or application of the CS, CV, or RR, Member States may resort to diplomatic channels or may use arbitration pursuant to the rules as expressed in the CV.\footnote{\textit{ITU Constitution, supra} note 7, art 56.} In case of an arbitration, the arbitration decision is binding upon the parties. The ITU should assist the procedure by providing to the arbitrator(s) all information necessary to render a decision.\footnote{Ibid., art 41.} The ITU also has an Optional Protocol on the Compulsory Settlement of Disputes Relating to the Constitution and Administrative Regulations which is valid between Parties who have ratified the Protocol, and which may be ratified by any Member State.\footnote{\textit{ITU Constitution, supra} note 7, Explanatory Notes.} If none of the afore-mentioned methods for settlement of disputes is chosen by common agreement between the parties to the dispute concerning the interpretation or application of any ITU instrument, the Optional Protocol may be requested as a solution, provided that the parties have previously adhered to the Protocol. In such cases, the Protocol will then initiate compulsory settlement by arbitration pursuant to the procedures as outlined in Article 41.5 of the Convention.\footnote{\textit{ITU, Optional Protocol on the Compulsory Settlement of Disputes Relating to the Constitution of the International Telecommunication Union, to the Convention of the International Telecommunication Union and to the Administrative Regulations,} compiled in Collection of the Basic Texts of the International Telecommunications Union Adopted by the Plenipotentiary Conference, 2011 Edition (Geneva: International Telecommunications Union, 2011) [\textit{Protocol}], art 1, 175.}

Most disputes at the ITU concern cases involving harmful interference. Whenever dealing with harmful interference, Member States should act with good faith and good will to avoid
harmful interference and resolve the situation. Mutual assistance is also required in order to promote a safe operating environment free of interference and used in accordance with the provisions of the Constitution, Article 45. In this regard, administrations should cooperate in both the detection and elimination of harmful interference.

There are some harmful interference cases that are particularly difficult to resolve through diplomatic channels because they generally involve issues of a complex political nature. As noted by Ram S. Jakhu, because the ITU does not possess any mechanism or power of enforcement or imposition of sanctions against the violators of its rules, regulations and processes (and even though the voluntary compliance approach has worked well in the past), it is doubtful whether this approach will work well in the future, as the number of State and non-State players is increasing, and the competition for scarce resources is becoming severe. Although this constitutes a clear gap in the ITU treaties, none of the Member States has proposed any amendment to rectify this problem.

The recent promulgation of the Permanent Court of Arbitration Optional Rules of Arbitration of Disputes Related to Outer Space Activities could provide both an adequate and desirable mechanism for the resolution of ITU-related disputes, especially to cases involving only private operators. Their broad scope of application, including the fact that they are not limited to outer space disputes, means that they can be used by any party; moreover, the extended confidentiality protections they provide make the Rules a particularly suitable mechanism for settling disputes within the ITU.

3.3 Organizational Structure of the ITU

The organizational structure of the ITU is rather complex, as it is comprised of several different bodies with different missions, but which also share common goals.

3.3.1 The supreme organ of the ITU is the PP, which is formed by a delegation of Member States and convenes every four years unless it decides to assemble an extraordinary one in between. The PP determines the general policies of the Union in order to accomplish its purposes in accordance with Article 1 of the CS. The PP also elects Member States to serve on the Council as well appointing the Secretary-General, Deputy-Director, the Directors of the Bureaux of the Sectors, and the Members of the Radiocommunication Board. Finally, the PP addresses proposals to amend the CS and CV, and conclude or revise agreements between the Union and international organizations that may have been initiated by the Council since the previous conference.

3.3.2 The Council is the organ that acts on behalf of the PP, and therefore governs the Union in between conferences, limited only by the delegated powers given to it by the PP. The Council members are elected by the PP, and must respect an equitable geographical distribution among all regions of the world. The Council facilitates the implementation of the ITU instruments, the

15 RR, supra note 6, art 15, para 14.
16 Ibid., art 15, para 17.
19 ITU Constitution, supra note 7, at arts 7, 8.
decisions of the PP, and any other ITU conferences and meetings. Among other duties, the Council shall respond to changes in the telecommunication sector, and therefore must consider broadening some policies in accordance with the guidelines provided by the PP. Finally, the Council shall contribute to the development of telecommunications in developing countries in accordance with the objectives of the Union. Currently, the elected Council to the 2014–2018 period is formed by 48 Member States divided among all geographic regions.20

- Region A (the Americas): 9 seats
  Argentina, Brazil, Canada, Costa Rica, Cuba, Mexico, the United States, Paraguay, Venezuela
- Region B (Western Europe): 8 seats
  France, Italy, Germany, Greece, Lithuania, Spain, Switzerland, Turkey
- Region C (Eastern Europe and Northern Asia): 5 seats
  Azerbaijan, Bulgaria, Poland, Romania, Russian Federation
- Region D (Africa): 13 seats
  Algeria, Burkina Faso, Egypt, Ghana, Kenya, Mali, Morocco, Nigeria, Rwanda, Senegal, Tanzania, Tunisia, Uganda
- Region E (Asia and Australasia): 13 seats
  Australia, Bangladesh, China, India, Indonesia, Japan, Korea (Republic of), Kuwait, Pakistan, Philippines, Saudi Arabia, Thailand, United Arab Emirates

3.3.3 The ITU also holds World Conferences on International Telecommunications, which are normally convened between two PPs. They include World Radiocommunication Conferences (WRC), the World Telecommunication Standardization Assembly (WTSA), the World Telecommunication Development Conference (WTDC), and Radiocommunication Assemblies (RA). The WRC and RA may convene one or two meetings between two PPs, while an additional WTSA could be exceptionally held in accordance with the specific provisions of the Convention.21

3.3.4 The ITU-R is the most important part of the ITU in terms of issues involving space. The ITU-R is required to always consider the particular needs of developing countries in fulfilling the objectives of the ITU by ensuring the rational, equitable, efficient, and economical use of the radio-frequency spectrum by all radiocommunication services, including those countries using the GSO or other satellite orbits, subject to the provisions of Article 44 of the Constitution. The ITU-R also conducts studies, without limit, of frequency range, and also adopts recommendations involving radiocommunication matters.22 The ITU-R works in close coordination with the Telecommunication Standardization and Telecommunication Development Sectors.23

The ITU-R is formed by Member States and Sector Members, and it performs its work through the following bodies:24

- World and Regional Radiocommunication Conferences;
- the Radio Regulations Board;
- Radiocommunication Assemblies;
- Radiocommunication Study Groups;

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20 ITU, Council Membership, online: www.itu.int/en/council/Pages/members.aspx.
21 ITU Constitution, supra note 7, art 7 and Convention, supra note 8, art 3.
22 ITU Constitution, supra note 7, art 12, n 1.
23 Ibid., art 12, n 2.
24 Ibid., art 12, n 2.
• the Radiocommunication Advisory Group; and
• the Radiocommunication Bureau.

3.3.5 WRCs are generally convened every four years, and they can revise the Radio Regulations or deal with any specific radiocommunication matters and/or any question of a worldwide character within their competence and associated with their agenda. While the decisions taken by a WRC may change the Radio Regulations, they also must be in conformity with the provisions of both the Constitution and the Convention.

3.3.6 The RRCs are conferences of regional character and are therefore limited to discussions involving regional matters. For instance, their agenda can only contain specific radiocommunication questions of a regional nature, including their instructions to the RRB and the BR, which must be restricted to their work within a specific region. Additionally, a particular RRC must take into consideration the actions of other RRCs, particularly when such actions involve regions over which the RRC has no jurisdiction. Hence, in other words, a particular RCC’s instructions may not conflict with the interests of other regions over which it has no jurisdiction. RCC decisions also must be in conformity with the Constitution, the Convention, and the Radio Regulations.

3.3.7 The RRB is comprised of elected members who are recognized by their qualifications in the field of radiocommunications and their practical experience in the assignment and utilization of radio frequencies. Members of the RRB shall consist of no more than 12, or 6 percent, of the total number of Member States, whichever number is greater. Although each Board shall be familiar with particular related conditions of a specific area of the world, they shall not represent specific countries or a region, and should refrain from interfering in decisions involving their own administrations. Therefore, RRBs are precluded from receiving or requesting any instructions from administrations, public or private organizations, or even from the Union itself. Conversely, Member States and Sector Members are required to respect their particular category of operations, and not influence RBB decisions.

The duties of the RRB are defined in Article 14 of the Constitution and include, inter alia:

• approval of the Rules of Procedure in conformity with the Radio Regulations and with decisions by radiocommunication conferences.
• examination of any other issue that cannot be resolved through the application of the Rules of Procedure.

Additionally, the Convention also defines that the RRB shall:

• consider reports from the Director of the BR on investigations of harmful interference and propose recommendations;

25 Ibid., art 13, n 1–2.
26 ITU Constitution, supra note 7, art 13, n 4.
27 Convention, supra note 9, art 9.
28 ITU Constitution, supra note 7, art 13, n 4.
29 The current composition of the RRB is the following: Japan (Chairman), Netherlands (Vice-Chairman), Morocco, United Arab Emirates, Vietnam, Ukraine, Kenya, Côte d’Ivoire, Italy, Russia Federation, Argentina and United States, ITU, Twelve Members, online: www.itu.int/en/ITU-R/conferences/RRB/Pages/Twelve-Members.aspx.
30 ITU Constitution, supra note 7, art 14.
31 Ibid., art 14.
32 Convention, supra note 9, art 10.
• consider appeals against decisions made by the BR regarding frequency assignments; and
• participate in an advisory capacity at radiocommunication conferences through its Board
members, with the caveat that when Board members are advising in conferences and
assemblies, they cannot simultaneously be members of their national delegations.

The Board generally convene four times during a year, and must be attended by a minimum
of two-thirds of its members. The decisions of the RRB shall attempt to reach consensus, but
if this is not possible, a majority of votes of at least two-thirds of the members shall be
binding.  

3.3.8 The purpose of the Radiocommunication Assembly is to consider the reports of study
groups and of the radiocommunication advisory group, and whether to modify, reject or
approve their recommendations. According to their approved program of work, the Assembly
decides both the fate of existing study groups and whether new groups should be created and,
if so, the questions they should attempt to answer. Additionally, the RA also reports to the next
WRC on the items that are related to their mandate and that are included in the agenda. 

Their decisions must be in accord with the provisions of the Constitution, Convention, and the
Radio Regulations.  

In addition to the questions adopted by radiocommunications assemblies, the radiocommu-
nication study groups investigate matters identified in resolutions and recommendations of the
world radiocommunication conferences, and prepare reports of their results for presentation at
these conferences. Although these studies should not discuss economic issues, they may
consider economic factors when comparing technical and operational choices. Furthermore,
they must give due regard to the study and formulation of proposals which are directly related
to the establishment, development, and improvement of telecommunications in developing
countries at both the regional and international levels. Finally, the Groups must also consider
and cooperate with the work performed at the national, regional, and international level by
other organizations dealing with radiocommunications while maintaining the superior,
international role of the Union in the field of telecommunications. 

As provided in the Convention, the focus of the study groups are limited to the following topics:

• use of the radio-frequency spectrum in terrestrial and space radiocommunication and of
the GSO and other satellite orbits;
• characteristics and performance of radio systems;
• operation of radio stations; and
• radiocommunication aspects of distress and safety matters.

3.3.9 The Radiocommunication Advisory Group acts through the Director, and is open to
participants from Member States, Sector Members, and chairs of study and other groups. The
Group’s duties are established in Article 11 bis of the Convention, which provides that the
Group shall: 

33 Ibid., art 10.
34 Ibid., art 8.
35 ITU Constitution, supra note 7, art 13, n 4.
36 Convention, supra note 9, art 11.
37 Ibid.
38 Ibid., art 11 A.
39 Ibid.
• Examine priorities, programs, operations, financial matters, and strategies concerning radiocommunication assemblies, study and other groups, and the preparation of radiocommunication conferences, and any specific issue determined by a conference, a radiocommunication assembly or the Council;
• Recognize areas in which the Bureau has not accomplished its objectives in order to advise the Director on the necessary remedial solutions;
• Offer guidance for the study groups; and
• Suggest actions to promote cooperation and coordination with the Telecommunication Standardization Sector, the Telecommunication Development Sector, and the General Secretariat.

3.3.10 The Radiocommunication Bureau (Bureau) is the executive portion of the Radiocommunication Sector (ITU-R). The work of the Sector is organized and coordinated by the Director of the Bureau. The Director must harmonize the work of study groups, participate in an advisory capacity in radiocommunication conferences, assemblies, and study groups, and also facilitate the participation of developing countries in conferences and study groups. The Director acts as executive secretary to the RRB, and also provides support to the Telecommunication Development Sector. The Bureau is formed by its Director, Chiefs of Departments, engineers, computer specialists, managers, and administrative staff.

The Bureau provides several essential services including:

• administrative and technical assistance to Radiocommunication Conferences, Assemblies, Study Groups, and Advisory Groups;
• application of the Radio Regulations and Regional Agreements;
• registration of frequency assignments and orbital positions in the Master International Frequency Register (MIFR) and updating the Master Register regularly;
• advice to Member States on the equitable, effective and economical use of the radio-frequency spectrum and satellite orbits, particularly at the GSO;
• investigation and support for Member States to resolve cases of harmful interference when requested, including the preparation of a Report to the RRB;
• assistance to developing countries and other Member States with technical information, seminars, and workshops on national frequency management to facilitate the implementation of the Radio Regulations and Member States’ obligations under the ITU instruments;
• cooperation with the ITU Telecommunication Development Bureau in providing assistance to developing countries;
• preparation and dispatch of circulars, documents, and publications developed within the Sector;
• promulgation of the Rules of Procedure by the Director to be approved by the Radio Regulations Board (RRB) and, after approval, collection of comments from Member States about the Rules, application of the Rules, the preparation and publishing of findings regarding such Rules, and submission to the RRB when there is request by an administration which cannot be resolved by the Rules itself;

41 Convention, supra note 9, art 12.
42 Ibid. and Radiocommunication, supra note 40.
• execution of studies regarding the operation of the maximum practicable number of radio channels in those portions of the spectrum where harmful interference may occur, with the objective of promoting the equitable, effective, and economical use of the GSO and other satellite orbits while considering the special needs of developing countries, the specific geographic situation of some particular countries, and requests for assistance from any Member State;
• preparation of a Report on the activities of the sector to the next WRC or to the Council if there is no WRC planned;
• preparation of an estimated Budget of the sector and its submission to the Secretary-General; and
• creation of an annual operation plan covering the forthcoming four years including financial aspects of the activities of the Bureau in support of the entire Sector.

3.3.11 The Telecommunication Standardization Sector studies technical, operational, and tariff-related questions, and adopts recommendations with the aim of standardizing telecommunication procedures worldwide in accordance with the objectives and purposes of the Union. The Sector also considers the special concerns of developing countries.\textsuperscript{43}

Standards are essential to the interoperability of Information and Communication Technologies (ICTs) because they enable global communications among the ICT networks and devices of different countries. All Member States and Sector Members are welcome to participate in the creation and development of ITU Recommendations in order to avoid costly market conflict regarding preferred technologies. The Sector also works closely with developing countries to balance the involvement of various levels of companies whether they be located in emerging or more advanced markets, and also focuses on the promotion of access to new markets. The Sector assists countries in building their telecommunications infrastructure, and encourages their economic development, through economies of scale, in order for them to reduce costs for manufacturers, operators, and consumers.\textsuperscript{44}

Close coordination is generally performed among all three Sectors: Radiocommunication, Standardization, and Development. Finally, any Member States and Sector Members can participate in the Sector in accordance with the provisions established by the Convention.\textsuperscript{45}

3.3.12 The main objective of the Development Sector is to foster international cooperation regarding telecommunication and ICT development issues. This includes\textsuperscript{46}

• the promotion of an environment for ICT development,
• the enhancement of confidence and security in the use of telecommunication and ICTs,
• promoting capacity building, digital inclusion and assistance to countries with special needs, and
• improving environmental protection, climate change adaptation, mitigation, and disaster management support through telecommunication and ICTs.

The Sector facilitates and enhances telecommunications development through technical cooperation and support activities, and must cooperate with the other Sectors in matters

\textsuperscript{43} ITU Constitution, supra note 7, art 17.
\textsuperscript{44} ITU, ITU in Brief, online: www.itu.int/en/ITU-T/about/Pages/default.aspx.
\textsuperscript{45} ITU, ITU in Brief, online: www.itu.int/en/ITU-D/Pages/About.aspx.
\textsuperscript{46} ITU Constitution, supra note 7, art 17.
\textsuperscript{47} Ibid. at Article 21.
relating to the development of telecommunications. In particular, the Development Sector focuses on the following actions:

- raising awareness of decision-makers concerning the important role of telecommunications in the national economic and social development program;
- providing information and advice on possible policy and structural options;
- encouraging the development, expansion, and operation of telecommunication networks and services, particularly in developing countries;
- promoting capacity building, planning, management, resource mobilization, and research and development;
- enhancing the growth of telecommunications through cooperation with regional telecommunications organizations and with global and regional development financing institutions;
- ensuring the execution of projects included in its development program;
- providing financial assistance in the field of telecommunications to developing countries through the promotion of cooperation and lines of credit with international and regional financial and development institutions;
- promoting programs to accelerate the transfer of technologies from developed to developing countries;
- encouraging participation by industry in telecommunication development in developing countries;
- offering advice on the choice and transfer of appropriate technology; and
- executing studies on technical, economic, financial, managerial, regulatory, and policy issues in order to offer appropriate advice as needed.

The Telecommunication Development Sector shall have as members either Member States or Sector Members.

### 3.3.13 The General Secretariat provides services to the members of the Union, and controls the administrative and financial aspects of the Union’s activities. The Secretariat also provides conference services, planning and organization of major meetings, information services, security, strategic planning, and corporate functions such as communications, legal advice, finance, personnel, procurement, internal audit, etc.

### 4 Allocation structure

#### 4.1 Allocation structure and principles

The allocation structure (Article 5 of the RR) and associated principles represent a basis for the planning and implementation of radiocommunication services. The current approach is based on a block allocation methodology with footnotes. The regulated frequency band (8.3 kHz–3 000 GHz) is segmented into smaller bands and allocated to over 40 defined radiocommunication services. The radio services are identified as primary or secondary (the latter shall cause no harmful interference to, or claim protection from, the former) and footnotes are used to further specify how the frequencies are to be assigned or used. The Table

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48 Ibid. at Article 21.
49 Ibid.
50 ITU, General Secretariat, online: www.itu.int/en/general-secretariat/Pages/default.aspx.
51 RR, supra note 6, art 1.
is organized into three Regions of the world (see Figure 7.1) and is supplemented by assignment and allotment Plans for some bands and services, and/or by mandatory coordination procedures.

4.2 Basic principles related to use of the Table

Using the Table as a starting point, the frequency spectrum management authority of each country selects appropriate frequencies with a view to assigning them to stations of a given service. Before taking the final decision to assign a frequency to a station in a given radiocommunication service in a given frequency band and to issue an appropriate license, the authority concerned should be aware of all other conditions regulating the use of frequencies in the band concerned, e.g.:

- Are there other mandatory RR provisions governing the use of the frequencies?
- Is the band concerned subject to a pre-established international assignment or allotment Plan? Are the characteristics of the assignment in accordance with the appropriate entry in the Plan? Is there a need to apply the Plan modification procedure prior to issuing a license?
- Is there a need for effecting the coordination procedure prior to notification of the concerned assignment to the Radiocommunication Bureau (Bureau) or prior to its bringing into use?
- Is the procedure mandatory or voluntary? Is the procedure specified in the RR or in a special agreement?

![Figure 7.1 Regions for purposes of frequency allocation of the RR](image)

Note: The shaded part represents the Tropical Zones as defined in Nos. 5.16 to 5.20 and 5.21 of the RR.
• Is there a need to notify the frequency assignment to the Bureau? When should such notification be effected? Which characteristics are to be notified? What action should be foreseen after the recording or otherwise of the frequency assignment concerned?

5 Regulations applying to the use of frequencies and orbits by satellite networks or systems

The specific procedures setting out the rights and obligations of the administrations in the domain of orbit/spectrum management and providing means to achieve interference-free radiocommunications have been laid down by successive WRCs on the basis of the two main principles referred to above: efficient use and equitable access. In order to put these principles into effect, two major mechanisms have been developed and implemented:

• A priori planning procedures (guaranteeing equitable access to orbit/spectrum resources for future use), which include:
  – the Allotment Plan for the fixed-satellite service using part of the 4/6 and 10–11/12–13 GHz frequency bands;\(^5\)\(^2\)
  – the Plan for the broadcasting-satellite service in the frequency band 11.7–12.7 GHz\(^5\)\(^3\)
and the associated Plan for feeder links in the 14 GHz and 17 GHz frequency bands;\(^5\)\(^4\)

• Coordination procedures (with the aim of efficiency of orbit/spectrum use and interference-free operation satisfying actual requirements), which include:
  – geostationary-satellite networks (in all services and frequency bands) and non-geostationary-satellite networks in certain frequency bands governed by the No. 9.11A procedure, which are subject to advance publication and coordination procedures;
  – other non-GSO networks (all pertinent services and certain frequency bands), for which only the advance publication procedure is required before notification.

6 Procedures applying to non-planned services

Coordination procedures are contained in Article 9 “Procedure for effecting coordination with or obtaining agreement of other administrations”. This article contains all elements of the procedures as well as referring to the provisions of Article 7 of Appendix 30 for the coordination of the fixed-satellite service (FSS) and the broadcasting-satellite service (BSS) in the 11.7–12.7 GHz band and the application of Article 7 of Appendix 30A for the coordination of the fixed-satellite service (space-to-Earth and Earth-to-space) and broadcasting-satellite service with frequency assignments to feeder links for broadcasting-satellite stations. Associated with Article 9 are also Appendix 4, which specifies the various data that must be furnished in any advance publication or coordination request and Appendix 5, that contains criteria for identification of administrations with which coordination is to be effected or agreement sought.

The coordination procedure is based on the principle of “first-come-first served”. Successful coordination of space networks or Earth stations gives an international recognition to the use of frequencies by these networks/stations. For such frequency assignments, this right means that other administrations shall take them into account when making their own assignments in order to avoid harmful interference. In addition, frequency assignments in frequency bands

\(^{52}\) Ibid., Appendix 30B.
\(^{53}\) Ibid., Appendix 30.
\(^{54}\) Ibid., Appendix 30A.
subject to coordination or to a plan shall have a status derived from the application of the procedures relating to the coordination or associated with the plan. The relevant provisions involve three basic steps:

• advance publication;\textsuperscript{55}
• coordination;\textsuperscript{56}
• notification.\textsuperscript{57}

6.1 \textit{Advance publication information (API) procedure}

6.1.1 The aim of the advance publication information (API) procedure is to inform all administrations of any planned satellite system and of its general description.\textsuperscript{58} This procedure provides a formal mechanism whereby any administration can make a preliminary assessment of the effect that a planned satellite network is likely to have on the stations of existing or planned satellite systems as well as its terrestrial stations in certain frequency bands\textsuperscript{59} and comment accordingly.

6.1.2 To this end, the administration responsible for the satellite network has to submit to the Bureau, for publication, the information stipulated in Appendix 4 to the RR. Advance publication information is simplified and streamlined except in those cases where no coordination procedure is applicable. \textbf{Section I} of Article 9 contains two Sub-Sections:

• Sub-Section IA, which applies to non-GSO satellite systems not subject to coordination under \textbf{Section II} of Article 9, for which Appendix 4 information needed to be provided is similar to that of coordination request; and
• Sub-Section IB, which applies either to GSO or non-GSO satellite systems subject to coordination under \textbf{Section II} of Article 9, for which the Appendix 4 information to be provided is quite simple. WRC-15 decision enters into force on 1 January 2017.

6.1.3 The advance information should reach the Bureau not earlier than seven years and preferably not later than two years prior to the planned date of bringing the network into use.\textsuperscript{60} This information, when complete, is published by the Bureau in an API/A special section annexed to its \textbf{BR IFIC Circular}, a copy of which is sent to all administrations.\textsuperscript{61}

6.1.4 The procedure specifies also the cases in which amendments to the previously published characteristics of a satellite network require re-application of the advance publication procedure; only the use of an additional frequency band or change in the orbital location by more than +/-6 degrees for a space station in the GSO will require the application of the advance publication procedure.\textsuperscript{62}
6.1.5 Upon receipt of the advance publication, administrations should check whether the planned system is likely to affect their existing or planned systems or stations. Administrations which have any comments should send them to the administration responsible for the planned system, with a copy to the Bureau.63

6.1.6 When it receives such comments under Sub-Section IA of Article 9, the administration responsible for the planned satellite network and the requesting administration shall endeavor to cooperate in joint efforts to solve any difficulties, with the assistance of the Bureau if so requested. The publishing administration may take those comments into consideration when initiating the coordination procedure.64

6.1.7 The advance publication process is the obligatory first phase of the regulatory registration procedure. It does not give the notifying administration any rights or priority; its main purpose is to inform all administrations of developments in the use of space radiocommunications65 and to establish a regulatory time-limit to bring into use and notify the assignments in the MIFR.

6.2 Procedure for effecting coordination of frequency assignments

6.2.1 Coordination is a further step in the process leading up to notification of the frequency assignments for recording in the Master Register. WRC-15 removed, as of 1.1.2017, the six-months’ time-limit between the advance publication (API) and coordination request (CR).66

The coordination procedure is a formal regulatory obligation both for an administration seeking to assign a frequency assignment in its network and for an administration whose existing or planned services may be affected by that assignment. An agreement arising from this coordination confers certain rights and imposes certain obligations on the administrations concerned; as such, coordination must be effected in accordance with the relevant regulatory procedures laid down in the RR and on the basis of technical criteria either contained therein67 or otherwise agreed to by the administrations concerned.

6.2.2 The coordination procedure in Section II to Article 9 contains two approaches, according to whether the request for coordination is sent by the requesting administration directly to the identified administrations (Earth station/terrestrial station or Earth station/Earth station (operating in opposite direction of transmission) coordination),68 or to the Bureau (space network/space network or space station/terrestrial station coordination69 and the procedure for seeking agreement70). In the latter case, the publication of the complete information in the BR IFIC by the Bureau is considered as the formal request for coordination whereas, in the former case, the formal coordination request is the one sent directly to the identified administrations and then processed on a bilateral basis by the administrations.

63 Ibid., no. 9.3 and 9.5B.
64 Ibid., art 9, sub-sect IB.
65 Ibid., nos.9.5A and 9.5C.
66 Ibid., No. 9.5D.
67 Ibid., Appendix 5.
68 RR, supra note 6, nos 9.15 to 9.19.
69 Ibid., nos 9.7 to 9.14.
70 Ibid., no. 9.21.
6.3 Requirement and request for coordination

6.3.1 Before an administration notifies to the Bureau under Article 11 or brings into use a frequency assignment to a space station, an Earth station intended for communication with a space station, or a terrestrial station within the coordination area of an Earth station, it must effect coordination of the assignment, as required, with any other administration whose space, Earth or terrestrial station frequency assignments are likely to be affected. The frequency assignments to be taken into account in effecting coordination or seeking an agreement are identified using the criteria in Appendix 5. The coordination may be undertaken on a “network basis” using the information relating to the space station, including its service area, and the parameters of one or more typical Earth stations located in all or part of the service area; or on the basis of individual frequency assignments to a space station or an Earth station.

6.3.2 For coordination cases listed under Nos. 9.7 to 9.14 and No. 9.21, the responsible administration shall send to the Bureau the request for coordination together with the appropriate information listed in Appendix 4. On receipt of the request for coordination, the Bureau will promptly examine the information in terms of completeness and conformity with the Convention, the Table of Frequency Allocations and other provisions of the RR. The Bureau will then examine the information received with a view to identifying any administration with which coordination under Nos. 9.7 to 9.14 and No. 9.21 may need to be effected.

6.3.3 In the above cases, the procedure of Article 9 (except for the case of No. 9.21) requires such coordination with any administration responsible for a frequency assignment to a space station, to an Earth station that communicates with such a space station, or to a terrestrial station, situated in the same frequency band as the planned assignment, pertaining to the same service or another service to which the band is allocated with equal rights or a higher category of allocation, which:

- is in conformity with the Convention, the Table of Frequency Allocations and other provisions of the RR; and
- is recorded in the Master Register with a favorable finding (including registration under No. 11.41); or
- coordinated under the provision of Article 9; or
- included in the coordination procedure with effect from the date of receipt by the Bureau of the characteristics specified in Appendix 4; or
- where appropriate, in conformity with a world or regional allotment or assignment plan and the associated provisions; or
- for terrestrial stations, operating in accordance with the RR, or to be so operated within the next three years from the date of publication of the coordination request, and:
- is considered to affect or be affected, as appropriate, having regard to the threshold levels and conditions given in Tables 5.1 and 5.2 to Appendix 5.

6.3.4 The threshold levels and conditions given in Tables 5.1 and 5.2 to Appendix 5 differ according to the specific cases of coordination. For example:

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71 Ibid., no. 9.6.
72 Ibid., no. 11.31, Rules of Procedure.
• for GSO/GSO, coordination is criteria based on coordination arc and/or DT/T or pfd depending on the band;\textsuperscript{73}
• for GSO FSS/GSO BSS involving Appendix 30 coordination is required when the power flux-density (pfd) of the GSO FSS network on the territory of the BSS administration exceeds specific values given in Appendix 4 to Appendix 30;
• for GSO/non-GSO, coordination is based on frequency overlap;\textsuperscript{74}
• for GSO BSS/terrestrial stations\textsuperscript{75} and GSO or non-GSO/terrestrial stations for the frequency bands covered by No. 9.11A, coordination is based on frequency overlap and visibility, if there exists no pfd hard or trigger limit for the particular band.

For frequency bands below 3 GHz (space-to-Earth), in addition to the overlap condition, coordination of GSO or non-GSO systems is required with respect to terrestrial stations if the pfd produced at the Earth's surface (GSO or non-GSO system) exceeds threshold values shown in Annex 1 to Appendix 5.

6.3.5 Appendix 5 also defines the conditions under which the agreement of an administration may be required under No. 9.21, and the cases for which no Article 9 coordination is required.

6.3.6 Finally, the Bureau will publish the complete information (Appendix 4 information and, as appropriate, the names of identified administrations with which coordination may need to be effected), in a special section of its BR IFIC. The list of administrations identified by the Bureau under Nos. 9.11 to 9.14 and No. 9.21 is only for information purposes, to help administrations comply with the procedure. Actual administration with which coordination is required is decided based on comments received from administrations within four months and are published in CR/D special section. The list of administrations identified under Nos. 9.7 to 9.7B is the formal list of administrations with which coordination is required, subject to provisions of Nos. 9.41 and 9.42. In addition to the administrations, for satellite networks are also identified under No. 9.7 except the band 21.4–22 GHz, the procedures of Nos. 9.41 and 9.42 would apply in establishing the final list of administrations and satellite networks that are included in the coordination procedures and published in CR/E special section.

6.3.7 For cases listed in Nos. 9.15 to 9.19 (Earth station/terrestrial station coordination or Earth station/Earth station (operating in opposite direction of transmission) coordination), for which the coordination request is sent directly by the initiating administration to the identified administrations, the administration receiving the request has 30 days from the date of the request to acknowledge receipt of the information. Should the administration fail to respond to the administration within 15 days of reminder of the request sent then it is possible to seek the assistance of the Bureau. Further, if administration does not respond to a request from the Bureau to acknowledge receipt, then it shall be regarded as unaffected and provisions of Nos. 9.48 and/or 9.48 would be applied by the Bureau on relevant frequency assignments. The coordination condition in these cases is generally based on the coordination area of an Earth station covering the territory of another administration.\textsuperscript{76}

\textsuperscript{73} RR, supra note 6, no. 9.7.
\textsuperscript{74} Ibid., nos 9.12 and 9.13.
\textsuperscript{75} Ibid., no. 9.11.
\textsuperscript{76} RR, supra note 6, Appendix 5.
6.4 Action upon a request for coordination

6.4.1 Having received a coordination request, an administration studies the matter with a view to determining the level of interference likely to be caused to frequency assignments of its networks or stations or caused to assignments of the proposed network or station by its own assignments. Within a total period of four months from the date of the publication of the request for coordination in the relevant special section or the date of dispatch of the coordination data, as appropriate, it shall:

- communicate its agreement to the proposed coordination; or
- provide to the notifying administration (with a copy to the Bureau) the technical data upon which its disagreement is based, along with its suggestions for resolving the problem (No. 9.52).

6.4.2 If an administration with which coordination is sought under Nos. 9.11, 9.12 to 9.14 or No. 9.21 fails to respond within the four-month period after the publication, this administration shall be regarded as unaffected.

6.4.3 The Bureau’s assistance can be requested at the coordination stage of the procedure, by either the notifying or an objecting administration with a view to resolving any difficulties which may arise. In the particular case of coordination requested under No. 9.14, and within the four-month period from the publication, an administration in need of assistance may inform the Bureau that it has existing or planned terrestrial stations which might be affected and request the Bureau to determine the need for coordination. This request shall be considered as a disagreement, pending the results of the analysis by the Bureau of the need for coordination.

6.4.4 As indicated above, there is an obligation for the notifying administration to coordinate with any administration which has initiated the coordination process at an earlier stage. However, there is also a provision stipulating that both the notifying administration and the objecting administration shall make every possible mutual effort to overcome any difficulties which may arise in a manner acceptable to the parties concerned. The intent of this provision is to facilitate the entry of the newcomer and, even though an administration was first in line, encourage concessions on the basis of mutual cooperation.

6.5 Procedure under Nos. 9.7 and 9.11

The procedure described in Nos. 9.7 and 9.11 is to be used for coordination of frequency assignments to stations in the broadcasting-satellite service (BSS) which are to operate in frequency bands not governed by any plan.

6.6 Procedure under No. 9.21

The use of space services operating in certain frequency bands is governed by the procedure under No. 9.21, in addition to coordination under other Article 9 provisions. This

77 Ibid., no. 9.50.
78 Ibid., 9.51 and 9.51A.
79 Ibid., no. 9.52C.
80 Ibid., no. 9.52A.
81 Ibid., no. 9.53.
supplementary procedure is to be applied in cases where a footnote to the Table of Frequency Allocations requires an agreement with an administration. The proposed assignment may only be deemed to be in conformity with the Table in the context of the footnote concerned after such agreement has been reached. The procedure to be followed is the same as the one described in above. In case the required agreement could not be reached, it is possible to notify the assignments under the provisions of No. 11.31.1 with respect to the relevant frequency assignments of those administrations with which agreement could not be obtained.

7 Notification and recording (Article 11)

7.1 The Master International Frequency Register

The procedure for notification and recording of space network frequency assignments in the MIFR is described in Article 11 of the RR. The MIFR represents one of the pillars of the international radio regulatory set-up as it contains all frequency usage notified to ITU. It should be consulted before selecting a frequency for any new user. For these reasons, notification of frequency assignments to the Bureau, with a view to their recording in the MIFR, represents an important obligation for administrations, especially in respect to those frequency assignments that have international implications.

7.2 Notification procedures

The process of notification of frequency assignments has been streamlined by the revisions of the RR by all recent WRCs, and the relevant provisions are contained in Article 11. In order to keep the process workable, the RR specify quite precisely what should be notified, when the notification information is to be submitted to the Bureau and what information has to be submitted.

According to these provisions, any frequency assignment liable to have an international implication has to be notified to the Bureau (notice shall reach the Bureau not earlier than three years before the assignments are brought into use). In other words,

- if an assignment is liable to cause interference to existing or future stations in another country or to suffer interference from such stations; or
- if that assignment is to be used for international radiocommunication; or
- if that assignment is subject to the Article 9 coordination procedure or is involved in such a case; or
- if it is desired to obtain international recognition for that assignment; or
- if it is a non-conforming assignment and if the administration wishes to have it recorded for information,
- it should normally be notified to the Bureau.\(^{82}\) The Bureau shall publish the notice in PART I-S of the BR IFIC, thereby ensuring that all administrations are informed of the use of the assignments and that they are taken into account in any future planning conducted at the national, regional or international level.

\(^{82}\) \textit{RR, supra note 6, Appendix 4.}
7.3 Notification examination by the Bureau and recording in the MIFR

The subsequent processing of a notice varies according to the frequency band and service concerned. Each notice is first examined with respect to its conformity with the Table and the other provisions of the RR (regulatory examination); this examination consists in checking that the assignment (frequency, class of station, notified bandwidth) does indeed correspond to an allocation in the Table or the footnotes thereto and, where appropriate, that it complies with other technical or operating conditions laid down in other articles or appendices of the RR (power limits, authorized classes of emission, minimum elevation angle, etc.). If the result of this examination is unfavorable and the administration concerned has not explicitly undertaken that the assignment shall be operated subject to not causing interference to assignments operating in conformity with the RR, making reference to No. 4.4 of the RR, the examination stops there and the notice is returned to the notifying administration after publication of the finding in PART III-S of the BR IFIC.

When the result of the first examination is favorable, the assignment is recorded in the MIFR, or examined further, if appropriate, from the viewpoint of its conformity with the coordination procedures or with a world or regional allotment or assignment Plan.

Following such examinations, the assignment is either recorded in the MIFR and published in PART II-S of the BR IFIC (if the finding is favorable) or is published in PART III-S of the BR IFIC and returned to the administration (if the finding is unfavorable). The administrations are normally advised to complete the coordination procedure with the identified administrations, or to apply the relevant Plan modification procedure. However, in some specific cases an administration may resubmit the notice without completing the coordination or Plan modification procedure and the concerned assignment may be recorded in the MIFR under specific conditions.

7.4 Time limits

The most important thing to keep in mind is the regulatory time-limit for bringing a satellite network into use and submitting notices for recording in the MIFR. The notified date of bringing into use of any assignment to a space station of a satellite network shall be no later than seven years following the receipt of the advance publication information. WRC-12 introduced further precision and defined bringing into use a satellite network in GSO as contained in No. 11.44B which requires that the frequency assignment to a space station in the geostationary-satellite orbit shall be considered as having been brought into use when a space station in the geostationary-satellite orbit with the capability of transmitting or receiving that frequency assignment has been deployed and maintained at the notified orbital position for a continuous period of ninety days. The notifying administration shall so inform the Bureau within thirty days from the end of the ninety-day period.

83 RR, supra note 6, no. 11.31.
84 Ibid., no. 11.32.
85 Ibid., no. 11.34.
86 Ibid., no. 11.44.
7.5 Responsibilities of the notifying administration after recording in the MIFR

Recording in the MIFR does not mean the end of activities for the notifying administration as regards the concerned frequency assignment. The notifying administration should remain in close cooperation with the licensing authority and satellite operator and any change in the characteristics of the concerned assignment has to be notified to the Bureau so as to be reflected in the MIFR, if necessary following additional coordination with the administrations of other countries concerned.

The notifying administration has also to respond to coordination requests of any administration which has initiated the coordination process at a later stage with the objective, on the basis of mutual cooperation, to overcome any difficulties which may arise in a manner acceptable to the parties concerned.\(^{87}\)

Furthermore, the notifying administration should remain in close contact with the monitoring authority so as to check whether the concerned frequency assignment is operated in compliance with the notified characteristics and whether other elements (e.g. frequency tolerance) are kept within the limits prescribed by the RR. The notifying administration should also initiate appropriate monitoring programs with a view to detecting any operational or technical irregularities in the operation of frequency assignments pertaining to other administrations, and to initiate appropriate actions in this regard, so as to ensure interference-free operation for stations under its jurisdiction.

8 The BSS plans and their associated procedures (Appendices 30/30A)

8.1 The BSS and associated feeder-link Plans and Lists

8.1.1 Appendices 30 and 30A to the Radio Regulations contain Plans for the broadcasting-satellite service (BSS) in the 12 GHz band and the associated feeder-link Plans in the fixed-satellite service (FSS) in the 14 and 17 GHz bands. These Plans are occasionally referred to as the “BSS and the associated feeder-link Plans” and were established with a view to facilitating equitable access to the geostationary-satellite orbit (GSO) for all countries. In Regions 1 and 3 there are also the Lists of additional uses, which are separated from the Plans and annexed to the Master International Frequency Register (MIFR).

8.1.2 The BSS and associated feeder-link Plans and Lists cover the following frequency bands:

- **Region 1**: 11.7–12.5 GHz (space-to-Earth); 14.5–14.8 GHz (Earth-to-space);\(^{88}\) 17.3–18.1 GHz (Earth-to-space);
- **Region 2**: 12.2–12.7 GHz (space-to-Earth); 17.3–17.8 GHz (Earth-to-space);
- **Region 3**: 11.7–12.2 GHz (space-to-Earth); 14.5–14.8 GHz (Earth-to-space); 17.3–18.1 GHz (Earth-to-space).

BSS and associated feeder-link assignments in these bands have primary status.

\(^{87}\) RR, supra note 6, no. 9.53.

\(^{88}\) For countries outside Europe.
8.1.3 The BSS and associated feeder-link Plans are presented in a tabular form in Articles 10 and 11 of Appendix 30 (hereafter referred to as AP30) and Articles 9 and 9A of Appendix 30A (hereafter referred to as AP30A) respectively. The regulatory procedures associated with the Plans are contained in the Articles of those Appendices. They apply to Plan implementation and modification as well as sharing with respect to terrestrial and other space services in the frequency bands of AP30/30A. Several technical annexes exist containing sharing criteria, calculation methods, and technical data relating to the Plans.

8.1.4 The BSS and associated feeder-link Plans are assignment plans. The Plans for Regions 1 and 3 are for national assignments only. In general each country in Region 1 has 10 assignments (channels) and that in Region 3 has 12 assignments (channels) at a single orbital location. Generally, it cannot be changed except under very limited conditions. All other changes such as modifications to assignments to add more channels, change of beam parameters, and so on. Will be permitted subject to successful application of the coordination procedure of Article 4 of AP30/30A, and once completed will be included in a “List”, called the “Regions 1 and 3 List of additional uses”. Assignments in the List must be compatible with assignments in the Plans.

8.1.5 Proposed modifications to the Region 2 Plan are possible and can only enter the evolving Region 2 Plan after they have satisfied all coordination requirements in accordance with Article 4 of AP30/30A. The Region 2 Plan has direct strappings between feeder-link and downlink assignments.

8.1.6 Characteristics of the national assignments, such as nominal orbital position, ellipse parameters and e.i.r.p. Values, are contained in Articles 10 and 11 of AP30 and Articles 9 and 9A of AP30A. More details, like the test points associated to each beam, are included in the SPS database, which is distributed in the BR. IFIC (space service). The parameters used in characterizing the Plan can be found in Annex 5 of AP30 and Annex 3 of AP30A. Each assignment in the Plan is based on overall $C/N$ values of 14 dB 99 percent of the worst month.

8.1.7 The Regions 1 and 3 List of additional uses was created at WRC-2000. The initial List consisted of satellite networks with:

- notified assignments in conformity with AP30/30A, which had been brought into use and for which the date of bringing into use was confirmed to the Bureau before 1700 hours (Istanbul time) on 12 May 2000; and
- assignments for which the procedures of Article 4 of AP30/30A were successfully completed and for which due diligence information was provided before 1700 hours (Istanbul time) on 12 May 2000, but which had not been brought into use and/or the date of bringing into use had not been confirmed to the Bureau.

There are individual Lists for the downlink and for the feeder-link (14 GHz and 17 GHz). The Lists are separated from the Plans and annexed to the MIFR. Assignments in the Lists must be compatible with assignments in the Plans. The Lists are evolving and are updated and published periodically by the Bureau, for example when a new network is added to a List. The detailed characteristics of all the assignments in the List are included in the above-mentioned SPS database.

89 ITU, “Space Network Systems Online” online: www.itu.int/sns/.
90 ITU, “Appendices 30 and 30A BSS Plan (including associated MSPACEg software)” online: www.itu.int/en/ITU-R/space/plans/Pages/AP30-30A.aspx.
8.2 Procedure for implementation of Plan or List assignments (Article 5)

8.2.1 The procedure of Article 5 of AP30/30A is applied when an administration notifies to the Bureau the use of its assignments in the appropriate Regional Plans or the Region 1 and 3 Lists using Appendix 4 format.

8.2.2 The Bureau then examines the submission to assure that the information received is complete, that the data elements are in conformity with Appendix 4, that the notified characteristics comply with those of the entries in the Plans or Lists, and the coordination requirements specified in the Remarks column of Article 10 or 11 of AP30 or Article 9 or 9A of AP30A, if any, are satisfied.

8.2.3 If the administration responsible for the Plan or List assignments wants them entered in the Master Register, the notified technical characteristics will have to comply with those listed in the Plans or Lists.\(^9\) The only exception is in limited cases of AP30/30A where it is evident that the deviation in its characteristics will not increase its interference potential to other assignments in the Plans or Lists or other services nor claim protection from other assignments in the Plan and/or the Lists.\(^9\)\(^2\)

8.3 Procedures for modifications to the Region 2 Plan or Regions 1 and 3 List (Article 4)

8.3.1 Although these Plans are based on *a priori* frequency assignments, nevertheless there is a possibility to make modifications (changes, additions and cancellations) to the Plans. Modified characteristics can be included in the Region 2 Plan or Region 1 and 3 List after successful application of the relevant procedures of Article 4 of AP30/30A.

8.3.2 The whole process for an assignment entering into the Region 2 Plan or Region 1 and 3 List through the application of Article 4 of AP30/30A can be divided into two stages:

- Stage A: for agreement seeking, relating to a submission under § 4.1.3 and 4.2.6 of AP30/30A and a publication in Part A of Special Section AP30/E/, AP30A/E or AP30-30A/E/ under § 4.1.5 and 4.2.8 of AP30/30A;
- Stage B: for inclusion into Region 2 Plan or Regions 1 and 3 List of AP30/30A, relating to a submission under § 4.1.12 and 4.2.16 of AP30/30A and a publication in Part B of Special Section AP30/E/, AP30A/E or AP30-30A/E/ under § 4.1.15 and 4.2.19 of AP30/30A.

8.3.3 Procedures for modifications to Region 2 Plan

8.3.3.1 The modification procedures for the Region 2 Plan are stipulated in *Section 4.2* of Article 4 of AP30/30A. The submission in Appendix 4 format shall be sent not earlier than eight years and not later than two years before the planned date of bringing into use the assignments of the proposed network. The Bureau examines the submission to assure that the information received is complete. The notifying administration has to provide missing information and clarification if requested by the Bureau. When the submission is considered as complete, its formal date of receipt is established. The Bureau treats the submissions in sequence of receipt.

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\(^9\) Ibid., prov 5.2.1 d.
8.3.3.2 In order to assess whether or not a proposed modification would affect other assignments in the Region 2 Plan, the Bureau has to evaluate the impact on the reference situation of all assignments in the Region 2 Plan using the criteria in § 2 and 3 of Annex 1 of AP30 and AP30A respectively. Additional technical examinations are necessary to determine whether other services (terrestrial, non-planned BSS and fixed-satellite services) and the appropriate Regions 1 and 3 Plan and List assignments that share the same frequency band are affected using the criteria in § 3, 4, 6 and 7 of Annex 1 of AP30 and § 5 of Annex 1 of AP30A. These examinations identify administrations whose services are considered to be affected. This information is published in Part A of Special Section AP30-30A/E/ of the International Frequency Information Circular (BR IFIC).

8.3.3.3 The administration proposing to include the modified assignment in the Plan then has to seek the agreement of those administrations whose services/assignments are considered to be affected and who have commented within the four-month period. When no comment is received within the four-month period, it is considered that the administration has agreed to the assignments of the proposed network. After the four-month period, the Bureau will publish the list of administrations whose agreements are required in Part D of Special Section AP30-30A/E/.

8.3.3.4 If agreements have been reached with all objecting administrations or the characteristics are modified to ensure that the identified networks of other administrations are no longer affected, the administration proposing the new or modified assignment can submit the final characteristics of the assignments in Appendix 4 format in order to include them in Region 2 Plan and may continue with the appropriate procedure under Article 5. In cases where an agreement cannot be reached between administrations, there are provisions in paragraphs 4.2.20 to 4.2.21D of Article 4 to enable the matter to proceed further by allowing the assignment to be provisionally included in the Region 2 Plan on a non-interference basis. In order to verify whether the coordination requirements have been fulfilled for successful completion of the Article 4 procedure, the Bureau performs a series of examinations. The technical examinations verify whether objecting administrations are excluded from the list of affected administrations and that no additional interference is imposed on an administration that has not objected or has previously agreed after an objection. Once the Article 4 procedure is completed, the modification is added to the Plan. If the proposed assignments are not included in the Region 2 Plan or not brought into use within eight years from the date of receipt of a submission under § 4.1.3 and 4.2.6 of AP30/30A, they will be cancelled.

8.3.4 Procedures for modifications to Regions 1 and 3 List

8.3.4.1 The Regions 1 and 3 Plan, however, cannot be changed except under very limited conditions. All other changes such as modifications to assignments, additional channels, change of beam parameters, and so on, are permitted subject to the procedures in Section 4.1 of Article 4 and, if successful, are included in the Regions 1 and 3 List of additional uses.

8.3.4.2 Similarly to modification to Region 2 Plan the submission in Appendix 4 format shall be sent not earlier than eight years and not later than two years before the planned date of bringing into use the assignments of the proposed network. When the submission is considered as complete, its formal date of receipt is established.

8.3.4.3 In order to assess whether or not a proposed modification would affect other assignments, the Bureau has to apply the criteria in § 1 of Annex 1 of AP30 and § 4 of Annex 1 of AP30A (EPM and power flux-density limits) to all entries in the Regions 1 and 3 Plan.

93 AP30/30A, supra note 88, art 4 § 4.2.15.
and List. Additional technical examinations are necessary to determine whether other services (terrestrial, non-planned BSS and fixed-satellite services) and the Region 2 Plan that share the same frequency band are affected. These examinations identify administrations whose services are considered to be affected using the criteria in § 3, 4 and 6 of Annex 1 of AP30 and § 5 and 6 of Annex 1 of AP30A. This information is published in Part A of Special Section AP30/E/ and/or AP30A/E/ of the BIFIC.

8.3.4.4 Similarly to modification to Region 2 Plan, the administration proposing to include a new or modified assignment in the List then has to seek the agreement of those administrations whose services/assignments are considered to be affected and who have commented within the four-month period. As agreed by WRC-15, an administration that has not notified its agreement either to the administration seeking agreement or to the Bureau within a period of four months shall be deemed to have not agreed to the proposed assignment unless assistance from the Bureau is requested by the notifying administration. The notifying administration may request the above-mentioned assistance in respect of an administration that is considered to be affected but has not commented within the above-mentioned four-month period. If the administration fails to reply within 30 days after the Bureau’s reminder, it shall be deemed to have agreed to the proposed assignments.

8.3.4.5 If agreements have been reached with all objecting administrations or the characteristics are modified to ensure that the identified networks of other administrations are no longer affected, the administration proposing the new or modified assignment can submit the final characteristics of the assignments in Appendix 4 format in order to include them in Regions 1 and 3 List and may continue with the appropriate procedure under Article 5. In cases where an agreement cannot be reached between administrations, the matter can proceed further by allowing the assignment to be provisionally included in the List on a non-interference basis. In order to verify whether the coordination requirements have been fulfilled for successful completion of the Article 4 procedure, the Bureau performs a series of examinations. The technical examinations verify whether objecting administrations are excluded from the list of affected administrations and that no additional interference is imposed on an administration that has not objected or has previously agreed after an objection.

8.3.4.6 Once the Article 4 procedure is completed, the assignment is added to the List. Assignments in the List have a maximum period of operation of 15 years. However, this may be extended for another 15 years if all the characteristics of the assignment remain unchanged. If the proposed assignments are not included in the Regions 1 and 3 List or not brought into use within eight years, they will be cancelled.

8.3.5 Space Operation Functions (SOF) in support of the operation of planned BSS networks

Article 2A of AP30/30A stipulates a coordination mechanism for the use of the guard bands of AP30/30A to provide Space Operation Functions (SOF) in support of the operation of planned BSS networks. To use the guard bands, advance publication information (API) is not required to be submitted. SOF assignments are to be coordinated with other assignments using the provisions of Nos. 9.7, 9.17, 9.17A, 9.18 and the associated provisions of Section II of Article 9, the provisions of § 4.1.1 d) 4.1.1 e) 4.2.3 d) or 4.2.3 e) of Article 4 of AP30 and § 4.1.1 d) of Article 4 of AP30A or the provisions of Article 7 of AP30/30A, as appropriate. SOF assignments are notified under Article 11.

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94 Ibid., art 4 paras 4.1.17 to 4.1.20.
95 Ibid., art 4v§ 4.1.11.
9 The FSS Plan and its associated procedures (Appendix 30B)

9.1 The FSS Plan and the associated List of assignments

9.1.1 Appendix 30B of the Radio Regulations contains the Plan for the fixed-satellite service (FSS) in the 6/4 GHz frequency bands and in the 13/10–11 GHz frequency bands. This Plan is also referred to as the “FSS Plan” and was established with a view to facilitating equitable access to the geostationary-satellite orbit (GSO) for all countries.

The FSS Plan covers the following frequency bands:

- 4 500–4 800 MHz (space-to-Earth);
- 6 725–7 025 MHz (Earth-to-space);
- 10.70–10.95 GHz (space-to-Earth);
- 11.20–11.45 GHz (space-to-Earth);
- 12.75–13.25 GHz (Earth-to-space),
- resulting in a total bandwidth of 800 MHz in each direction.

FSS assignments in these bands have primary status.

9.1.2 The FSS Plan is contained in Appendix 30B (hereafter referred to as AP30B) together with its associated regulatory procedures. Several annexes exist containing criteria, calculation methods, and technical data relating to the Plan. The FSS Plan is an allotment plan. Each allotment in the Plan comprises:

- a nominal orbital position;
- a bandwidth of 800 MHz (uplink and downlink) as listed in paragraph 1 above;
- a service area for a national coverage.

Characteristics of the national allotments, such as nominal orbital position, ellipse parameters and power-density values, are contained in Article 10 of AP30B. More details, like the test points associated to each beam, are included in the AP30B database, which is distributed in the BRIFIC (space service).96

The parameters used in characterizing the Plan can be found in Annex 1 of AP30B. Each allotment in the Plan is based on C/N values of 21 dB and 15 dB for uplink and downlink respectively under rain-faded conditions and availability of 99.95 percent for the 6/4 GHz frequency bands and 99.9 percent for the 13/10–11 GHz frequency bands. In addition, the Plan has been prepared with a view to ensuring for each allotment an overall aggregate C/I value of 21 dB and a single-entry C/I value of 25 dB under free space path loss conditions.

9.2 Procedure for implementation of allotment in the Plan or introduction of an additional system

9.2.1 Before the orbital position and frequency resources of an allotment can be utilized by a satellite system, the national allotment has to be converted into an assignment through the application of the procedures of Article 6 of AP30B. The assignments are then recorded in the AP30B List (hereafter referred to as List), and they are entitled to protection against systems received by the Bureau at a later date.

9.2.2 Additional systems can also be included in the List after successful application of the relevant procedures of Article 6 of AP30B. In the context of this Appendix, an additional system is a system for which the assignments are not the result of conversion of an allotment into assignments. When an administration submits an additional system, the allotment of that administration in the Plan is retained.

9.2.3 The whole process for an assignment entering into the List through the application of Article 6 of AP30B can be divided into two stages:

- Stage A: for coordination/agreement seeking, relating to a submission under § 6.1 of AP30B and a publication in Special Section AP30B/A6A/ under § 6.8 of AP30B;
- Stage B: for inclusion into the List of AP30B, relating to a submission under § 6.17 of AP30B and a publication in Special Section AP30B/A6B/ under § 6.23 of AP30B.

The detailed characteristics of all the assignments in the List are included in the above-mentioned AP30B database.

9.2.4 After being entered in the List of AP30B, an assignment can be notified for its inclusion into the Master Register.97

9.3 Procedure for inclusion of assignment in the List (Article 6)

9.3.1 The procedure of Article 6 of AP30B is applied when an administration submits to the Bureau either: the conversion of an allotment into an assignment, the introduction of an additional system or the modification of an assignment in the List that has already been brought into use. The submission shall be sent not earlier than eight years and not later than two years before the planned date of bringing into use the assignments of the proposed network. The Bureau examines the submission to assure that the information received is complete and the data elements are in conformity with the requirements of Appendix 4 and the Table of Frequency Allocations. The notifying administration has to provide missing information and clarification if requested by the Bureau. When the submission is considered as complete, its formal date of receipt is established. The Bureau treats the submissions in sequence of receipt.

9.3.2 The Bureau first examines the submission against the limits in Annex 3 of AP30B as well as other limits contained in Articles 21 and 22 of the RR. Following a favorable finding, the Bureau further evaluates the impact of the proposed assignments on the reference situation of allotments in the Plan, the assignments in the List and the assignments that the Bureau has previously examined, using the method and criteria of Annex 4 of AP30B. This examination under § 6.5 of AP30B identifies administrations whose networks are considered to be affected. The Bureau also identifies the administrations whose territories have been partially or wholly included in the service area of the assignments under examination in accordance with § 6.6 of AP30B. The submitted information and the names of the identified administrations are published in a Special Section AP30B/A6A/ of the BR. IFIC together with the relevant AP30B database.

9.3.3 The administration whose networks are identified as being potentially affected (under § 6.5 of AP30B) should send its comments to the Bureau and to the notifying administration (directly or through the Bureau) within four months following the publication of the AP30B/A6A/ Special Section. When no comment is received within the four-month period,
it is considered that the administration has not agreed to the assignments of the proposed network unless an assistance under § 6.13 to § 6.15 of AP30B is requested by the notifying administration.

9.3.4 The notifying administration may request the above-mentioned assistance in respect of an administration that is considered to be affected but has not commented within the above-mentioned four-month period. If the identified administration fails to reply within 30 days after the Bureau’s reminder, it shall be deemed to have agreed to the proposed assignments.

9.3.5 The comments from the administrations whose territories are included in the service areas of the published assignments can be sent at any time during or after the above-mentioned four-month period. The notifying administration must obtain explicit agreement from those administrations before the assignments are included in the List.

9.3.6 For the purpose of entering into the List, the administration proposing the new or modified assignments has to either reach agreement with affected administrations or modify the characteristics of its assignments to ensure that the identified networks of other administrations are no longer affected. The final characteristics of the proposed assignments should be submitted to the Bureau in accordance with § 6.17 of AP30B together with the names of administrations with which agreements have been reached. The Bureau checks if required agreements from the identified administrations are obtained.\(^98\) If not, an unfavorable finding is given to the assignments and the whole notice is returned to the administration. In the examination under § 6.22 of AP30B the Bureau uses the method and criteria in Annex 4 of AP30B to identify the newly affected networks due to the changes of characteristics. If all the examinations lead to favorable findings, the submitted assignment is entered in the List and is published in a Special Section AP30B/A6B/ of the BR IFIC. If the examination leads to unfavorable findings, the submitted notice is returned. However, if a notice is returned due to unfavorable findings under Annex 4 of AP30B examination with respect to assignments, but the findings with respect to the allotments in the Plan are favorable, the submitted assignments can be provisionally entered in the List after resubmission of the notice by the notifying administration, together with a commitment indicating that its assignments shall not cause unacceptable interference to nor claim protection from the assignments for which agreement still needs to be obtained.\(^99\)

9.3.7 If the proposed assignments are not included in the List within eight years from the date of receipt of a submission under § 6.1 of AP30B, they will be cancelled.

### 9.4 Procedure for inclusion of assignment in the MIFR (Article 8)

9.4.1 Any assignment for which the relevant procedure of Article 6 of AP30B has been successfully applied shall be notified to the Bureau in accordance with Article 8 of AP30B not earlier than three years before the assignment is brought into use.

9.4.2 The Bureau first examines the notification to verify its compatibility with the Table of Frequency Allocations, the Plan, and other relevant provisions of the Radio Regulations and then examines its conformity with the characteristics of the corresponding assignment in the List. A new assignment is included in the Master Register and published in Parts I-S and II-S of the BR IFIC if the examinations lead to favorable findings. If the examinations lead to unfavorable findings, the assignment is published in Part III-S, and returned.

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\(^98\) Ibid., § 6.19 & § 6.21.

\(^99\) AP30/30A, supra note 88, Appendix 4, A.19a.
9.4.3 If an assignment is not notified and brought into use within the eight-year regulatory period, the assignment in the List will be cancelled. If the cancelled assignment is the result of a conversion from an allotment, this allotment shall be reinstated with the same characteristics as the cancelled assignment, except for its service area, which should be the national territory.

9.5 Procedure for the addition of a new allotment for a new Member (Article 7)

9.5.1 An administration that has joined the Union as a new Member State and does not have a national allotment in the Plan or an assignment stemming from the conversion of an allotment can obtain a national allotment in application of Article 7 of AP30B. That administration shall submit its request for an allotment to the Bureau, with the following information:

- the geographical coordinates of not more than 20 test points for determining a minimum ellipse to cover its national territory;
- the height above sea level of each of its test points;
- any special requirement which is to be taken into account to the extent practicable.

9.5.2 The request for a new allotment is processed ahead of submissions received under Article 6 of AP30B which have not yet been examined. The Bureau proposes appropriate technical characteristics and associated orbital positions for the new allotment and informs the requesting administration, who should respond to the Bureau’s proposal within 30 days.

9.5.3 Upon receipt of a reply on the selection of an orbital position and technical parameters from the requesting administration, the Bureau verifies its compatibility with allotments, assignments in the List and the assignments which have been examined as well as the conformity with the Table of Frequency Allocations and other provisions of the Radio Regulations.

9.5.4 The new allotment is then included in the Plan and published in a Special Section of BR IFIC if the above-mentioned examinations lead to favorable findings.100

9.5.5 If affected administrations are identified in this process, the corresponding agreements are required. If the calculated C/I values of the new allotment are below the required criteria, the requesting administration has to accept the excess degradation. Otherwise, the request for a new allotment in the Plan will be treated as a submission and processed ahead of other Article 6 submissions which have not yet been examined by the Bureau.101

10 Administrative due diligence (Resolution 49 (WRC-12) and Resolution 552 (WRC-12))

10.1 Following one of the recommendations in the report by the Director of the BR on Resolution 18 (Kyoto, 1994), WRC-97 adopted Resolution 49, which has been modified by subsequent WRCs, on the administrative due diligence applicable to some satellite communication services as a means of addressing the problem of reservation of orbit and spectrum capacity without actual use. This resolution will apply to any satellite network of the fixed-satellite service, mobile-satellite service or broadcasting-satellite (except in 21.4–22 GHz band) service in frequency bands subject to coordination under Section II of Article 9, as well as

100 Ibid., AP30B/A7/.
modifications of the Appendices 30 and 30A Plans and additional uses in the Appendix 30B planned services.

10.2 For the above cases, an administration shall send to the Bureau due diligence information relating to the identity of the satellite network (name of the satellite, notifying administration, reference to the special section publication, frequency range, name of the operator, orbital characteristics) and the spacecraft manufacturer (name of the manufacturer, date of execution of the contract, delivery window, number of satellites procured); this information is to be submitted as early as possible before bringing into use, but must in any case be received before the end of the seven-year period established as a time-limit for bringing into use a satellite network. Before notifying its satellite network for recording in the MIFR, the administration shall also send to the Bureau information relating to the launch services provider (name of the launch provider, date of execution of the contract, anticipated launch or in-orbit delivery window, name of the launch vehicle, name and location of the launch facility).

10.3 After verifying its completeness, the Bureau will publish the information in a special section of the BR IFIC. Should an administration fail to supply the complete required due diligence information in time, the networks concerned shall be cancelled (cancellation of the coordination request or modification to the Plan or entry in the MIFR) and shall not be recorded in the MIFR.

10.4 Resolution 552 (WRC-12) contains due diligence procedure for BSS in the band 21.4–22 GHz. The Resolution is entitled “Long term access to and development in the band 21.4–22 GHz in Region 1 and 3”. The content of this resolution is somewhat similar to Resolution 49 and new data elements are required to be submitted by administrations under this Resolution, which are listed in Annex 2 to the resolution. Under this resolution administrations have to submit due diligence information not only when the space station is brought into use for the first time but also submit information about any further change, like deorbiting of the satellite or moving of the satellite to another orbital location. Further, this Resolution requires ITU to provide an ITU-ID for each physical satellite network brought into use in this band and this satellite ID remains same for the life time of the satellite irrespective of the orbital location of the satellite or its responsible administration until it is deorbited.

11 Cost recovery

11.1 Cost recovery is to apply to satellite network filings received by the Bureau after 7 November 1998. Additionally the WRC-03 and WRC-07 adopted provisions referring to Decision 482, as amended, under which a satellite network filing is cancelled if payment is not received in accordance with the provisions of this decision.

11.2 The cost recovery for satellite network filings is consistent with the general principles for cost recovery adopted in Resolution 91 (Minneapolis, 1998), in particular resolves 4 and the need to ensure that no more than the actual costs of providing products and services are recovered.


11.3 It is applicable for the production of the special sections of the BR IFIC (space services) concerning advance publication (API), and their associated requests for coordination\textsuperscript{104} and requests for modification of the space service plans and lists contained in Appendices 30, 30A and 30B to the RR, received by the Bureau after 7 November 1998. It is also applicable to all satellite network filings concerning notification for recording of frequency assignments in the MIFR\textsuperscript{105} received by the Bureau on or after 1 January 2006 if, they refer to advance publication or modification of the space service plans or lists, as appropriate, received on or after 19 October 2002 and for all requests for the implementation of the fixed-satellite service plan (former Sections I A and III of Article 6 of Appendix 30B to the RR) if, they have been received by the Bureau on or after 1 January 2006.

11.4 Each Member State shall be entitled to the publication of special sections or parts of the BR IFIC (space services) for one satellite network filing each year without the charges referred to above. Each Member State in its role as the notifying administration may determine which network shall benefit from the free entitlement.

11.5 Publication of special sections for the amateur-satellite service, the notification for recording of frequency assignments for Earth stations, for the conversion of an allotment into an assignment in accordance with the procedure of former Section I of Article 6 of Appendix 30B, the addition of a new allotment to the plan for a new Member State of the Union in accordance with the procedure of Article 7 of Appendix 30B and submissions under resolves 3 and 4 of Resolution 555 (WRC-12) shall be exempt from any charges.

12 Pico, nano and small satellites

There is no regulatory definition for small satellites. The RR recognize only GSO and non-GSO satellites. During WRC-12, the conference considered that nanosatellites and picosatellites might require regulatory procedures which take account of the short development cycle, the short lifetimes and the typical missions of such satellites. The conference requested the ITU-R to examine the procedures for notifying space networks and consider possible modifications to enable the deployment and operation of nanosatellites and picosatellites, taking into account the short development time, short mission time and unique orbital characteristics\textsuperscript{106}.

12.1 ITU-R study related to satellite systems using nano and picosatellites

The ITU-R WP 7B is currently studying a Question ITU-R 254/7 “Characteristics and spectrum requirements of satellite systems using nano and picosatellites”:

\begin{itemize}
  \item[a)] What are the distinctive characteristics of nano and picosatellites and satellite systems in terms of their use of the radio spectrum as defined by data rates, transmissions time and bandwidths?
  \item[b)] Taking into account such distinctive characteristics, what are the spectrum requirements for nano and picosatellite systems?
  \item[c)] Under which radiocommunication services can satellite systems using nano and picosatellites operate?
\end{itemize}

\textsuperscript{104} RR, \textit{supra} note 6, art 9.
\textsuperscript{105} Ibid., art 11, Appendices 30/30A art 5 and Appendix 30B, art 8.
\textsuperscript{106} ITU, Resolution 757 (WRC-2012) “Regulatory aspects for nanosatellites and picosatellites”, online: www.itu.int/dms_pub/itu-r/oth/0c/0a/R0C0A00000A0025PDFE.pdf.
The space research, Earth exploration, amateur, and educational communities, like other communities focused on leveraging space-based radiocommunication technologies, have an interest in utilizing the potential benefits offered by small satellites, including those referred to as nanosatellites or picosatellites. These technologies allow many projects to be developed quickly and deployed with lower cost than with traditional, larger satellites. While even the most advanced nanosatellites are typically no more than a few million United States Dollars (USD), the smallest missions may have a total developmental and operational budget (excluding launch and ground infrastructure) of only a few tens of thousands of USD. Small satellites also provide a means for testing emerging technologies and economical commercial off-the-shelf (COTS) components that may be useful in future space missions, including those utilizing larger satellite platforms. They offer new opportunities for existing and new satellite operators, such as universities, educational institutes, governments, and private industry that might not otherwise have considered or been able to afford the use of satellite technologies. They have been demonstrated in a variety of practical applications, including Earth observation, space astronomy, space physics, and maritime communications. Recent proposals for the use of small satellites include solar system exploration, interplanetary and even outer solar system missions.

12.2 Characteristics of small satellites

Small satellites are commonly described as:

- ranging in mass from 0.1 to 10 kg and measuring less than 0.5 m in any linear dimension, with physical characteristics that differ from those of larger satellites;
- typically taking a short (1–2 years) development time and low cost, often using off-the-shelf components;
- having an operational lifetime ranging from several weeks up to a few (< 5) years depending on their mission;
- being used for a wide variety of missions and applications, including remote sensing, space weather research, upper atmosphere research, astronomy, communications, technology demonstration and education, as well as commercial applications, and therefore may operate under various radiocommunication services;
- typically launched as secondary payloads;
- requiring simultaneous launches and operation of several such satellites in formation or as a constellation for some missions;
- limited orbit control capabilities.

To carry out the studies related to the question the class of objects to which the studies apply, as opposed to all satellites, needs to be established. A convenient way to classify satellites is by their mass. Satellites that weigh less than ~500 kg are often referred to as small satellites; they can be further classified as shown in Table 7.2 and challenge matrix in Table 7.3.

The Bureau recently organized a global Symposium to addresses regulatory requirements for small satellite communication systems with aim to ensure sustainable deployment of new generation of small satellites in outer space.\(^\text{107}\)

13 Space protocol

The Space Protocol is part of a family of international treaties beginning with the Convention on International Interests in Mobile Equipment\(^{108}\) and the Protocol on Matters specific to Aircraft Equipment\(^{109}\). The Space Protocol is an instrument designed to facilitate asset-based financing for the acquisition and use of space assets, such as satellites and transponders that move beyond frontiers.

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Under an international legal framework of asset-based financing, a creditor could enforce its rights against the equipment in the event of default by the debtor. Under the current legal regime, it is the law governing the location of the equipment that will normally decide questions regarding the validity, priority ranking and enforcement of security and leasing rights in such equipment. However, there is currently no applicable law governing the location of equipment in space. From the viewpoint of a lender, this situation makes the risks of asset-based financing less acceptable.

The Space Protocol is establishing the legal foundation for the creation, priority ranking and enforcement of security and leasing rights in space-based equipment. One of the key features of the Space Protocol is the creation of an international registry for space assets in which those rights may be registered. The Registry would determine priority among rights on the basis of the first-come, first-served principle to give lenders a degree of legal certainty relating to asset-based financing. The Registry would be operated and administered by the Registrar on a 24 hour / seven day a week basis.

The Supervisory Authority would oversee the operation of the Registry by the Registrar. In particular, it would nominate and dismiss the Registrar, monitor its activities, establish regulations in relation to the functioning of the Registry after approval by Contracting States and would be assisted by a commission of experts nominated by Signatory and Contracting States. It would determine and periodically review the structure of fees for the Registry’s services.

13.1 The Space Protocol: progress and outcomes


Draft implementation schedule:

- 2015: Completion of the Regulations for the International Registry for Space Assets/Selection of the Registrar (Rome, 10–11 December 2015);
- 2016: Proposal for the selection of a Registrar, determination of the fees for use of the Registry facilities, establishment of a Commission of experts to assist the Commission in the discharge of its function;
- 2017: Taking the above achievement into account, the Preparatory Commission would act with full authority as Provisional Supervisory Authority for the establishment of the International Registry for Space Assets and would possibly be in a position to hand over responsibility to ITU in the 2017 timeframe subject to the entry into force of the Protocol (three months after the deposit of the tenth instrument of ratification, approval, accession) and provided that ITU officially notifies its decision to assume the role of Supervisory Authority.

The ITU’s role as Supervisory Authority of the future international registration system for Space Assets under the Space Protocol has been discussed since 2011 within the organization. In that regard, the 2014 session of the ITU PP agreed that “[the ITU] Council continue to monitor any further development on this matter, and that the Secretariat continue to express interest in ITU becoming the Supervisory Authority and respond to any questions raised by the Member States between now and the next Plenipotentiary Conference” noting that the matter of whether or not ITU could become the Supervisory Authority should not be prejudged at the current stage.\textsuperscript{111}

14 Concluding thought

As has been previously articulated by one of this chapter’s authors, “With a concerted effort, we can reduce, and to the extent possible remove, all obstacles impeding the development and bringing into operation of new satellite networks; we have to think carefully about how we can continue to use and improve satellite access to help connect the unconnected, and make the world a better and a fairer place for all.”\textsuperscript{112} This should be kept in mind as an objective for the ITU, lest the spirit of the endeavor be lost in highly technical regulations and procedures.

\textsuperscript{111} ITU, “Supervisory Authority of the future international registration system for Space Assets” online: www.itu.int/en/ITU-R/space/Pages/spaceAssets.aspx.