



HANDBOOK

SATELLITE FILLINGS AND COORDINATION

ATU-R Handbook 001-0

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List of Acronyms

ITU - International Telecommunication Union - <http://www.itu.int/>

CS - Constitution of the ITU

CV - Convention of the ITU

RR - ITU Radio Regulations

Bureau - Radiocommunication Bureau of the ITU

ITU-R - Radiocommunication Sector of the ITU

WRC - World Radiocommunication Conference of the ITU

GSO - Geostationary-Satellite Orbit

Non-GSO - Non-Geostationary-Satellite Orbit

Table - Table of Frequency Allocations as contained in Article 5 of the RR

MIFR - Master International Frequency Register of the Bureau

BR IFIC - International Frequency Information Circular of the Bureau

Definitions

Administration - Any governmental department or service responsible for discharging the obligations undertaken in the CS and CV of the ITU and in the Administrative Regulations.

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1. EXECUTIVE SUMMARY

The study on the state of the satellite resources has shown that Africa is lagging behind in terms of optimum acquisition, retention, and utilization of satellite resources. Lack of adequate resources by African countries to conduct satellite coordination and proper implementation of the procedures on coordination and notification of satellite networks as set out in the ITU Radio Regulations is amongst the most important factors that have contributed to the current situation.

Satellite filing and coordination are two essential steps in order to get access to the orbit/spectrum resources that are necessary for the successful implementation of any satellite project. While these steps should of course not be underestimated, it is equally essential that they remain integrated into an overall satellite project in order to produce any meaningful outcome.

Recognizing that the ITU Radiocommunication Bureau (BR) has developed extensive material to help administration to understand and implement the procedures and regulations defined in the Radio regulations applicable to space services, further the ATU Task Group Sat Resources agreed to develop an easy-to-understand document, containing practical tips on satellite filing and coordination, as a complement to enhance the benefits to African countries.

This document provides principles and approaches for the satellite filing and coordination. The aim is to provide spectrum management practitioners in the African administrations with some reasoning behind the rules embodied in the RR and the procedures implemented by the BR.

In addition, this document presents how these two activities (satellite filing and coordination) are connected with the overall development of a satellite project and their relationships with other technical and operational activities of satellite projects.

Finally, **Annex 1** of this document presents a more detailed explanation of the various regulatory procedures to be followed for satellite filing and coordination. **Annex 2** provides a list of relevant reference resources that are available to the ITU membership.

2. INTRODUCTION

The International Telecommunication Union (ITU) is the United Nations specialized agency for information and communication technologies – ICTs. Founded in 1865 to facilitate international connectivity in communications networks, ITU allocates global radio spectrum and satellite orbital slots, (including related coordination issues), develops the technical standards that ensure networks and technologies seamlessly interconnect, and strives to improve access to ICTs to underserved communities worldwide.

ITU has three main areas of activity organized in Radiocommunication, Standardization, and Development Sectors¹ which work through conferences and meetings.

Through international conferences, study groups, the ITU develop the technical recommendations, that aid its frequency spectrum and satellite orbital slots management activities, as well as providing a forum for the resolution of international interference difficulties.

Satellite orbital slots are valuable and limited resources, which need to be planned and managed for the efficient use of, and also, the avoidance of harmful interference between satellite networks.

The international regulatory environment established under the ITU provides a broad framework for the approval process for obtaining orbit positions and authorization to transmit to and from satellites.

They confer recognition of a given country's use of the frequency and orbital slots, which in turn offers protection in the form of "registration" of the particular frequency assignment in the master register of the ITU.

Only administrations of ITU member states can submit, modify or suppress information related to satellite systems, and exchange coordination information with other administrations. The notifying administration for satellite network filings are responsible for the registration of all national Allotments, Assignments, and Satellite Network filings recorded in the Master International Frequency Register (MIFR) of the ITU.

As part of its filing requirements, the ITU requires information submitted accompanying satellite network filings to indicate a serious and firm intention to establish the satellite networks. In accordance with the provisions of the ITU RR, only the satellite network filings recorded in the ITU MIFR will receive the due regulatory protection from satellite network filings of later date.

In view of the above, administrations should adopt specific measures at the national level to take into consideration of ITU's requirements for filed satellite systems with the ITU. Generally, the principles guiding administrations when developing their policy framework on satellite spectrum and orbits use are as follows:

- Consistency in applying the international Radio Regulations (RR);
- improving the national processes in managing national and international coordination related to spectrum use for satellite services; and

¹ for more information see www.itu.int

- ensuring protection to existing services in a given country in regard to the use of the same spectrum for satellite services.
- protect its allocated spectrum and orbital resources, in particular to satisfy future needs and support the implementation of a national/regional space program.

This document outlines some of the satellite network filing and coordination activities to be carried out by the national administration to achieve efficient and effective use of orbital slots. It provides practical tips as well as operational guidance for the implementation of the rules relevant for satellite filing requests and international frequency coordination involving satellite services.

3. BASIC CONSIDERATIONS

3.1 Types of satellite networks/systems

- a) Satellite systems may be categorized into two types, namely, geostationary satellite orbit (GSO) and non-geostationary satellite orbit (non-GSO).
- b) The orbital slot occupied by a satellite will determine the coverage area on Earth and the characteristics of the satellite operation. Satellites operating in the GSO, which is at an altitude of approximately 35,800 km in the plane of the equator, have an orbital period equal to the Earth's rotation period (one sidereal day). Thus, the satellites appear to be at a fixed position in the sky from ground observers. Communications satellites and weather satellites are often given GSO, so that the antennas on ground that communicate with them do not have to move to track them, but can be pointed permanently at the position in the sky where they stay.
- c) The non-GSO satellite's position relative to the Earth is not fixed. There are a few types of non-GSO such as Highly Elliptic Orbit (HEO), Medium Earth Orbit (MEO) and Low Earth Orbit (LEO). The non-GSO satellite network uses a wide variety of earth stations to support different kinds of services and users.
- d) GSO satellites have been the exclusive means of providing commercial space-based communications. With advances in technology, non-GSO satellites are used to fulfil a wide range of mobile-service and fixed service communication needs as well. The regulatory structure governing satellite communications is designed to fit GSO and NGSO characteristics.

3.2 Interference scenarios

There are various modes of interference between stations in space and terrestrial services:

3.2.1 Interference mode between space service and terrestrial service:

- A-1 The transmission of a terrestrial station may interfere with reception at an earth station;
- A-2 The transmission of an earth station may interfere with the reception of a terrestrial station;
- C-1 Transmission from a space station may interfere with reception at a terrestrial station;

- C-2 Transmission from a terrestrial station may interfere with reception in a space station.

3.2.2 Interference mode between stations belonging to different space systems, operated in part of the spectrum where separate bands are allocated to Earth-to-space paths and space-to-Earth paths:

- B-1 The transmission of a space station of one space system may interfere with reception at an earth station belonging to another space system;
- B-2 Transmission from an earth station in one space system may interfere with reception at a space station belonging to another space system;

3.2.3 Interference mode between stations belonging to different space systems, operated in a frequency band allocated for bidirectional use:

- B-1 The transmission of a space station of one space system may interfere with reception at an earth station belonging to another space system;
- B-2 Transmission from an earth station in one space system may interfere with reception at a space station belonging to another space system;
- E- The emission of a space station of a space system can interfere with the reception in a space station belonging to another space system;
- F- The transmission of an earth station in one space system may interfere with reception at an earth station belonging to another space system.

The provisions of RR deal precisely with all cases of interference in order to allow the development of the services concerned without the risk of harmful interference. Interference types A2, C1, C2 have been regulated by imposing appropriate limits on the radiated power, particularly in the critical direction.

A1 and A2 type interference is subject to a coordination procedure which must be applied by the Administrations concerned when the "coordination zone" surrounding an earth station (transmitting or receiving) extends over the territory from another country.

For type B1 and B2 interference, an assessment is made of the apparent rise in the equivalent noise temperature of the satellite link, produced by another satellite link.

3.3 Brief overview of the ITU Radio Regulations

3.3.1 The ITU Radio Regulations contain the rules and procedures for the planning and use of frequency spectrum by administrations of ITU member states.

3.3.2 Under international law and treaty, ITU Member States are obliged to follow the rules, procedures, and allocations contained in these regulations. Not following the rules risks the loss of protection of frequencies that an administration itself might require.

3.3.3 The main areas of focus of the Radio Regulations are:

- a) Terms and definitions that are used (Article 1);

- b) General rules for using frequencies (Article 4 which provides provisions on the assignment and use of frequencies);
- c) The Table of Frequency Allocations (Article 5), which is central to the regulatory process; In Section I of Article 5 provisions Nos. 5.1 to 5.22 provide details on Regions and Areas that are referenced throughout the RR. In Section II provisions Nos. 5.23 to 5.44 provide details on the categories of services and allocations utilized, in particular, in the Table of Frequency Allocations. In Section III provisions Nos. 5.46 to 5.52 provide a description of the Table of Frequency Allocations. Section IV provides the Table of Frequency Allocations from 8.3 kHz to 275 GHz, noting that provision No. 5.565 details frequency bands that have been identified by administrations for passive service applications in the range 275-1000 GHz. Section IV of Article 5 also includes a substantial number of footnotes to the Frequency Table. Footnotes provide further regulatory detail on the use of one or more of the radiocommunication services allocated in particular frequency band(s).
- d) Procedures for frequency coordination (Chapter III): Articles 9 and 11 of the RR set out timeframes for submission of information including Advance Publication Information (API), Coordination Request (CR) and Notification. The associated Rules of Procedure also set out what the ITU Radiocommunication Bureau (BR) will do and the obligations of both notifying and affected administrations.
- e) Provisions about the responsibility of interference management by the administrations (Article 15).
- f) Provisions relating to the issuance of licences for transmitting stations (Article 18).
- g) Techniques and rules for sharing bands between space and terrestrial services: Article 21 provides provisions for services and stations relating to terrestrial and space services sharing frequency bands above 1 GHz;
- h) Special regulations for particular types of services, particularly for GEO and non-GEO satellites: Article 22 provides provisions for services and stations relating to space service.
- i) Appendices that lay out particular plans and analysis techniques referred to in some of the articles. For example, Appendix 7 provides methods for the determination of the coordination area around an earth station in frequency bands between 100 MHz and 105 GHz. Appendix 8 provides the method of calculation for determining if coordination is required between geostationary-satellite networks sharing the same frequency bands. Appendix 30A contains the plan for the assignment of orbit positions and frequency channels for the Broadcasting Satellite Service in Regions 1 and 3.
- j) Resolutions and Recommendations incorporated by reference in various Articles of the RR (Volume 3 of the RR). Footnotes in Article 5 can require that the texts as contained

in these Resolutions and Recommendations apply to the use of a space radiocommunication service in particular frequency bands.

- k) Characteristics of satellite networks, earth stations or radio astronomy stations (Appendix 4).

3.4 Satellite filings and coordination activities in support of a satellite project

- 3.4.1 As indicated in **Recommendation ITU-RS.1254²**, one of the best practices to facilitate the coordination process of satellite networks relies on exchanging accurate and up-to-date satellite and service parameters on a regular and timely basis during the process.
- 3.4.2 In order to be able to do so, it is necessary to commence the satellite coordination with a prior knowledge of the intended satellite service parameters, which is only possible if the satellite project has gone through a first phase of design where the main applications intended to be provided by the satellite have been defined, the initial technical parameters of the satellite have been determined (what kind of orbit? what frequency bands? what types of earth stations?) and link budgets for each of these identified applications have been computed taking into account potential interference from other systems.
- 3.4.3 When these steps have been completed, a first round of regulatory checks can be performed on these parameters, notably to determine if the allocated frequency bands that were chosen are in practice usable within the intended service area (difference between international allocations in Article 5 of the Radio Regulations and national allocations contained in each country's national table of frequency allocations) and to assess if the computed radio parameters are within the various power limits set forth in the Radio Regulations.
- 3.4.4 The result of these checks should then be re-inputted into the technical assessments and link budgets in order to modify them to be compliant with the international and national regulatory frameworks. It may happen at this stage that several options of equal value are emerging: for example, in the case of a geostationary-satellite network, several orbital positions can be considered as equal interesting or feasible. This is the reason why there are often multiple filings submitted to ITU in order to cover one satellite project (approximately 4 to 5 geostationary filings for 1 geostationary satellite brought into use). Only the detailed coordination process and the negotiations with other administrations will determine which of these filings is the most appropriate to operate the satellite in a manner commensurate with the performance objectives.
- 3.4.5 This iterative process between the technical design of the satellite, its operational implementation and the satellite coordination should be maintained during the entire lifetime of the project, including after its bringing into use, in order to ensure

² See **Recommendation ITU-R S.1254- Best practices to facilitate the coordination process of fixed-satellite service satellite networks**

that the satellite coordination process supports the operations of the actual in-orbit satellite.

4. GENERAL ASPECTS FOR ACCESS TO SATELLITE RESOURCES: PLANNED VS NON-PLANNED SERVICES

4.1 The Radio Regulations contain procedures leading to a recording in the MIFR for space services relating to bands that are either planned, or that are accessible on a “first-come-first-served basis” (non-planned services).

4.2 An assignment in a non-planned service results from an application by an operator for an assignment in a given band, with a specified coverage and a particular orbital position. Such applications are in general, filed on a first-come-first-served basis.

4.3 In the planned services, equitable access to spectrum is guaranteed by a priori planning (for example, by way of an allotment plan identifying a particularity of channels, an orbital location, a set of technical characteristics and a given service area for each administration), normally carried out at a world or regional planning conference. Each administration submits its requirements, technical bases for the plan are established at the conference and a plan is drawn up in relation to the available spectrum. Assignments are then pre-registered in the names of specific administrations. The assignment or allotment plans form part of the Radio Regulations.

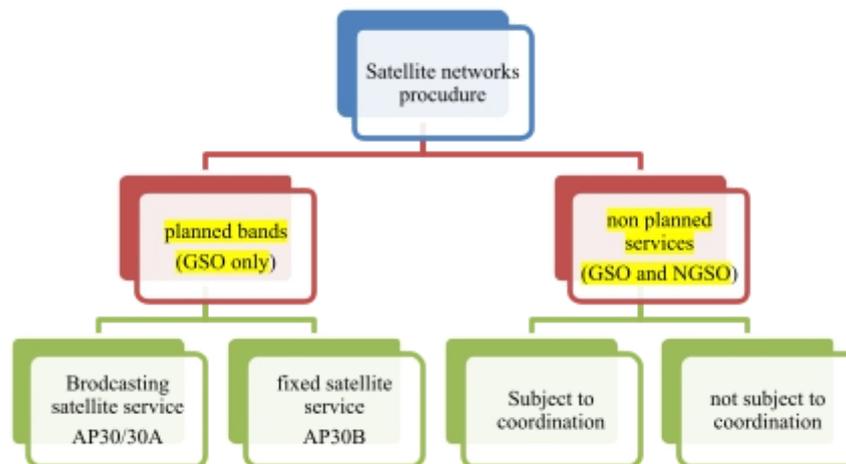


Figure 1: Satellite networks procedures

5. SATELLITE NETWORKS FILINGS SUBMISSION PROCEDURES

A satellite network filing can only be submitted to the ITU by an administration of an ITU Member State in accordance with the provisions of the RR and Rules of procedures.

These include compliance with the provisions of RR Article 5 (Table of Frequency Allocations), Article 9 (Procedures for effecting coordination with or obtaining agreement of other administrations) and Article 11 (Notification and recording of frequency assignments), as well as obligations under Article 44 of the Constitution. After the administration accepts a filing request and issues a licence to the successful applicant, it proceeds to file the satellite network submission to the ITU.

The notifying administration is responsible to ensure that satellite networks under its responsibility comply with the provisions of the ITU RR.

5.1 The generic steps involved in bringing a country satellite network into use are as follows:

- a) The administration files the Advanced Publication Information (**API**) with ITU as provided by the operator for satellite systems not subject to coordination;
- b) ITU publishes the API in the Space Radiocommunication Bureau (**BR**) International Frequency Information Circular (**IFIC**);
- c) Arising from the ITU's publication of the API in the Space BR IFIC, other administrations may advise the notifying administration of existing services that they believe may be affected by the published satellite network;
- d) The administration files a Coordination Request (**CR**) filing with ITU as provided by the operator for satellite systems subject to coordination;
- e) ITU publishes the CR filing in the Special Section CR/C of the Space BR IFIC;
- f) Arising from the ITU's publication of the CR filing in the Special Section CR/C of the Space BR IFIC, other administrations may advise the notifying administration of existing services that they believe may be affected by the published satellite network;
- g) In the event that coordination is required, the administration will assist the satellite operator to co-ordinate the published satellite network with those existing networks of other administrations that may be affected by its operation; and
- h) When coordination is completed, the administration files a Notification Request with ITU and seeks inclusion of the satellite network in the MIFR.

5.2 All satellite filings received to administration from the operators need to be evaluated against the existing systems with the aim of protecting these systems.



Figure 2: Interaction between national operators and notifying administration

5.3 Operators may make a request to administration for the submission of a new Satellite Network filing, consisting of:

- 5.3.1 **Non-Planned services** under the provisions of Articles 9 and 11 of the ITU RR (where an Assignment results from an application by an operator to the administration for an Assignment in certain bands with a specific coverage and orbital position or orbit constellation and where the applications will be filed by notifying administration on a first-come-first-served basis); The steps in the coordination procedures for satellite networks in non-planned services include Advance Publication Information and Notification for satellite systems not subject to coordination, and Request for coordination and Notification for systems subject to coordination.

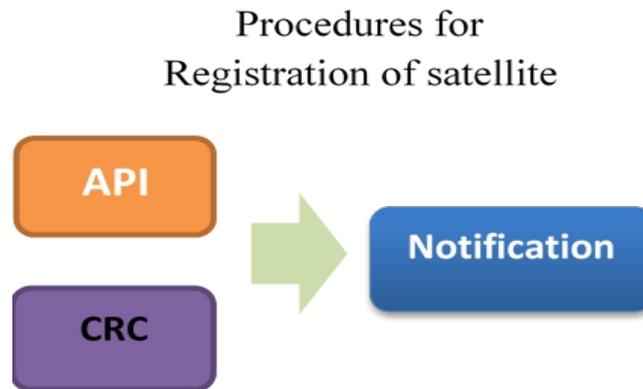


Figure 3: Registration procedures

Registration procedures of Non-Planned services:

- a) Advanced Publication Information - API (With respect to Satellite Networks not subject to the coordination procedure set out in the ITU RR),
 - i) The first stage is the submission of the API to ITU by the notifying administration.
 - ii) The date of receipt by the ITU of the API from notifying administration marks the start of the 7-year regulatory period.
 - iii) This kind of Satellite Networks are required to be notified and brought into use, before the end of the 7-year regulatory period.
- b) Coordination Request – CRC or CR (With respect to Satellite Networks in the non-planned services subject to the coordination procedure set out in the ITU RR),
 - i) The first stage is the submission of the CR (compliant with the ITU RR) to ITU by the notifying administration, in accordance with the ITU procedures.
 - ii) The date of receipt by the ITU of the CR from notifying administration marks the start of the 7-year regulatory period.

- iii) This kind of Satellite Networks are required to be notified and brought into use, before the end of the 7-year regulatory period.
- c) Notification of frequency assignments (With respect to Satellite Networks Subject /not subject to the coordination procedure)
 - i) The notification of a frequency assignment to the ITU-BR in accordance with Article 11 of the Radio Regulations is the final regulatory step leading to the recording of the frequency assignments in the Master Register.
 - ii) The provisions relating to notification of frequency assignments stated in Article 11 of the Radio Regulations.
 - iii) With respect to the Notification of an Assignment of a Satellite network in accordance with the ITU RR shall be submitted to notifying administration.
 - iv) On the notification, the operator must provide type of service to be provided by means of the Satellite Network, report summarizing the status of coordination and Satellite procurement contracts and launch services contracts. In addition to impact assessment in relation to existing national Satellite Networks and proposals to avoid causing Harmful Interference, including confirmation of any mitigation measures to avoid Harmful Interference to such existing national Satellite Networks.

For more details, see Section n°4 of the Annex 1 to this document.

5.3.2 **Planned services** and relevant provisions. The Radio Regulations contain three Appendices dealing with the satellite Plans (Broadcasting Satellite Service and Fixed Satellite Service) and associated regulatory procedures and technical annexes for these Plans as follows:

- a) **Appendix 30**, setting out the provisions for all services and associated plan and list for the broadcasting-satellite service (BSS) in the range 11.7-12.5 GHz;
- b) **Appendix 30A**, setting out the provisions and associated plan and list for feeder links for the BSS in the range 17.3-18.1 GHz; and 14.5 -14.8 GHz (outside of Europe).

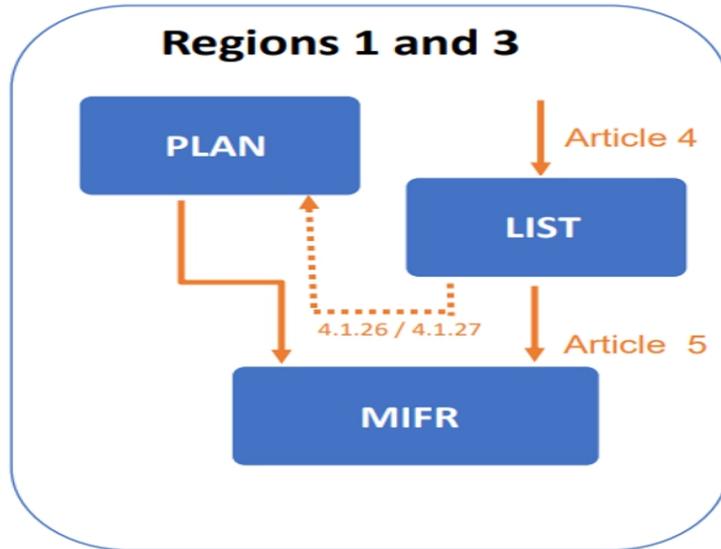


Figure 4: AP30/30A regulatory procedures

- c) **Appendix 30B**, setting out the provisions and associated plan for the fixed-satellite service (FSS) in the frequency ranges 4500-4800 MHz (space-to-Earth), 6725-7025 MHz (Earth-to-space), 10.7-10.95 GHz (space-to-Earth), 11.2-11.45 GHz (space-to-Earth) and 12.75-13.25 GHz (Earth-to-space).



Article 6 of AP30B

Article 8 of AP30B

Figure 5: AP30B regulatory procedures (Articles 6 and 8)

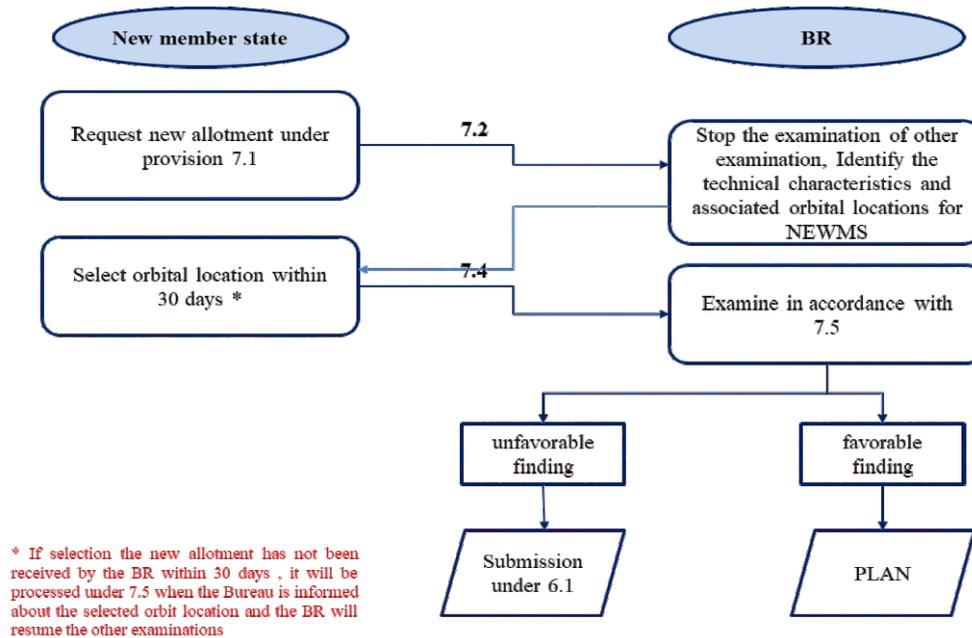


Figure 6: AP30B regulatory procedures (Article 7)

5.4 New ITU Member States that do not have a national allotment in the Plan or an assignment stemming from the conversion of an allotment may obtain a national allotment by applying Article 7 of Appendix 30B.

In accordance with § 7.3 of Article 7 of Appendix 30B, the request for a new allotment is processed ahead of submissions received under Article 6 of Appendix 30B that have not yet been examined. The Bureau is requested to propose orbital positions. Nevertheless, the requesting administration shall indicate the final orbital position.

The request for a new allotment would be included in the FSS Plan should the Bureau’s examination under § 7.6 of Article 7 of Appendix 30B leads to a favourable finding; otherwise the proposed new allotment would be treated as a submission under § 6.1 and would be treated by the Bureau ahead of any other submissions received under Article 6, except for submissions which were already under examination under § 6.5 by the Bureau at the time of completing the examination of the request of the new Member State under § 7.5.

5.5 Processing of Appendix 30B submissions:

In accordance with § 8.5 of Article 8 as well as §§ 6.5, 6.21 and 6.22 of Article 6, complete notices are examined by date order of their receipt, except for the following two special types of submission:

- Requests for new allotments received in accordance with Article 7
- Submissions received in accordance with Resolution **170** (WRC-19).

In such cases, they will be treated by the Bureau ahead of submissions for which the examination under § 6.5 has not yet started.

5.6 For Article 7 request, the Bureau will carry out the following examinations:

- Identification of suitable orbital positions
- The requesting administration to select the final orbital position.
- Examination of the proposed allotment using the final orbital position ahead of submissions for which the examination under § 6.5 has not yet started:
 - with respect to the Table of Frequency Allocation, hard limits contained in Annex 3 to Appendix **30B** and hard limits contained in RR Article 21 and Article 22 as listed in the associated Rule of Procedure on § 6.3 of Article 6.
 - identification of any administration together with its allotment/assignments which are considered as being affected.
- If the Bureau reach favourable finding, the proposed new allotment will be entered in the FSS Plan; otherwise the proposed allotment of the Member State shall be treated as a submission under § 6.1 and shall be treated by the Bureau ahead of any other submissions received under Article 6, except for submissions which were already under examination under § 6.5 by the Bureau at the time of completion of the examination of the request of the new Member State under § 7.5.

5.7 Under the above-cited Appendices, the ITU Member States have a pre-assigned GSO orbital position and related frequency assignments / allotments and technical characteristics.

In accordance with Appendices 30 and 30A, an administration in Regions 1 and 3 can ask for additional uses through the application of the procedure of Section 4.1 of Article 4. In addition, an administration may request a WRC to include a new assignment or modify an existing assignment in the BSS and associated BSS feeder-link Plans by applying provision 4.1.26 or 4.1.27, as appropriate.

The Appendix 30B, as prescribed in its Article 6, contains relevant procedures for the conversion (with or without modification) of an allotment into an assignment and for the introduction of an additional system. Also, it contains a procedure for the addition of a new allotment to the Plan for a new Member State of the Union (Article 7 of Appendix 30B). Modification of the FSS Plan, if any, is the subject of a WRC based on the relevant request of concerned administration.

The notification of the planned frequency assignments shall be done in accordance with Article 5 (Appendixes 30 and 30A) and Article 8 (Appendix 30B), respectively.

For more details, see Sections n°6 and 7 of the Annex 1 to this document.

6. COORDINATION PROCEDURES

6.1 Definition and approaches for frequency coordination

- a) Through the procedures in Chapter III, the Radio Regulations define how an administration can employ a particular allocation of the spectrum and assign a frequency to one of its users.
- b) Theoretically, an administration checks the allocation to see if the frequency fits a predefined category. If so, it follows the procedure for informing the BR and other administrations whose radio communication services could be interfered with by the operation of the proposed radio station or stations. The affected administration may agree or disagree to the use of that frequency or band. Any disagreement must be resolved through the process of frequency coordination, which involves bilateral negotiations between the applicant and incumbent and multilateral procedures that might include a special conference. The ITU-BR will provide assistance to either administration to help resolve a disagreement as to the rules and criteria for interference.
- c) Space-based radio transmitters are more of a concern because of their greater potential to radiate into the territory of more countries. If the transmission could cause interference, then the administration must follow the convoluted process of frequency coordination, which is defined in the Radio Regulations. This gives the other administrations a chance to decide if they want to allow this particular station to go on the air. A successfully coordinated frequency assignment can be recorded in the Master International Frequency Register (the Master Register) of the ITU and thereby gain international status.
- d) The principle of a priori planning was established as a way to guarantee entry for countries that were late to construct their own satellite systems. For instance, the WARC-77 produced two worldwide Ku-band BSS plans that assigned at least one slot to every member of the ITU for the purpose of satellite broadcasting. Also, segments of C-band and Ku-band were allocated to the FSS and preassigned to administrations through the Allotment Plan. An allotment is made of a particular frequency or band segment to a particular country or area. This gives each administration an orbit position and access to the spectrum for a variety of purposes. The need for coordination is reduced but not eliminated.
- e) A frequency assignment is usually made by an administration to one of its domestic users. From a domestic standpoint, a user obtains permission to use a particular frequency through a license granted by the administration. Frequency assignments consider the particular power, frequency, bandwidth, and modulation type. These in turn can be registered with the BR in order to gain international recognition and protection. The way the frequencies get registered is that the appropriate administration follows the procedure for coordination.

6.2 General Steps in the International Frequency Coordination Process

- a) The process of international frequency coordination is required because the spectrum and orbit space are limited resources and must be shared by all nations and users. Because

this process is technically complex and often political, cooperation with the ITU-R is required.

- b) Beginning at the top, the ITU develops the frequency allocations and rules for coordination; next, the administration participates in the ITU activities at the WRC and oversees the assignment and user of frequencies within its domestic borders; and finally, the user applies for and obtains frequency assignments and the authority to operate from the administration.
- c) A planned user of the orbit and spectrum, such as a company proposing to launch a GEO satellite, must therefore apply to the national regulatory body, which acts as the administration for the particular country. The user will usually be required to prepare the actual applications that are forwarded to the BR by the administration.
- d) There are basically two types of frequency coordination: terrestrial coordination, for land-based microwave transmitters; and space coordination, for radio transmitters and receivers on satellites.
- e) In order to gain the right to use any radio frequency to provide satellite communication services, administrations are required by the Radio Regulations, which is the international treaty text governing the use of the finite radio frequency resource, to comply with technical and regulatory requirements and procedures laid out in the RR.
- f) One of the important regulatory requirements and a very effective mechanism in managing harmful interference between space radiocommunication services is to carry out coordination of the radio frequency assignments with other administrations before using them.
- g) The regulatory text for this coordination requirement is contained in the Radio Regulation.
 - Article 9 for non-planned services.
 - AP30, AP30A and AP30B for the modified uses in the planned services, it is the initiative of the administration wishing to implement a new satellite network to start the coordination procedure.
 - After the submission of the API, CRC and AP30/30A/30B filling, as appropriate, the BR will publish the list of administration and satellite networks that may have a potential for interference from the new satellite network.
 - The BR identifies potential affected network based on the following mechanisms:

Trigger Arc		
±6 degrees :	FSS/BSS → BSS/FSS or FSS/SRS → SRS/FSS	Ku band
±7 degrees :	FSS→FSS	C band
±8 degrees :	FSS→FSS	Ka, Q, V bands and above
New WRC-19	FSS /Meteo. Sat. → Meteo. Sat./FSS	Ka band (18 GHz)
	FSS/BSS → BSS/FSS	Ka band
	MSS/FSS → MSS/FSS	Ka band
±12 degrees :	BSS → BSS	Ka band (21.4-22 GHz Reg. 1&3)
±16 degrees :	FSS → BSS, BSS→ FSS, BSS→BSS	Ka , Q, V bands and above
ΔT/T		
<ul style="list-style-type: none"> Any other service or sharing scenario where Trigger Arc is not applicable. Request to include/exclude a Network/Administration in/from Coordination under 9.41. 		
C/I		
<ul style="list-style-type: none"> For Notification purposes only, when 11.32A is requested. 		
PFD		
<ul style="list-style-type: none"> RES 762 (WRC-15) Application of 11.32A to FSS and BSS in 6 GHz and 10/11/12/14 GHz ranges. PFD at the GSO in case of uplink between networks separated by more than 6 deg. (Ku) or 7 deg. (C) PFD within potentially affected Service Area in downlink for networks separated by more than 6 deg.(Ku) RES 554 (WRC-12) PFD Masks to identify coordination requirements under 9.7 for BSS in 21.4-22 GHz Regions 1 and 3. 		

Figure 7: Mechanisms of identification of the affected networks

- Administrations need to ensure before submission of notification data for the subject satellite network to the ITU-BR that coordination has been completed with other affected networks with higher regulatory precedence. In such cases, the operator must submit copies of the completed coordination agreements to administration.
- In some cases, where it is satisfied that adequate efforts have been made to achieve coordination, administration can submit notification data under No. 11.41 for a satellite network to the ITU-BR where coordination is still in progress with other affected networks with higher regulatory precedence. In such cases, the operator must notify administration that coordination for such satellite network is not completed with other affected networks and provide the relevant information on the status of the coordination.
- Any operation of a network notified under these circumstances can only be on a non-interference and non-protection basis with respect to any senior network with which coordination was not completed.

- Should the network recorded under No. 11.41 cause harmful interference to any senior network with which coordination was not completed, the operator responsible for that network shall immediately eliminate such interference, as per No. 11.42.
- h) Administrations may conduct meetings as a way of coordinating their Assignments.
- i) Coordination enables parties interested in providing satellite services to exchange information, analyse interference scenario and work out solutions that will allow their existing and planned satellite networks to operate without causing harmful interference to one another.
- j) Coordination is a continuing or ongoing effort. It should continue as long as the use of the radio frequency is required for the satellite service as it is essential in maintaining the quality and reliability of the satellite service.
- k) Coordination outcomes can affect viability of projects, business decisions and marketing plans.

6.3 Frequency and Orbit Coordination

6.3.1 Satellite networks or systems that are not subject to the coordination procedure

- a) The Advance Publication of Information (API) is required for satellite networks or systems that are not subject to the coordination procedure under Section II of Article 9. API should be provided to the ITU in the first step no earlier than 7 years not later than 2 years before the start of operation, is a general description of the proposed satellite network to allow other administrations to assess the potential impact on their existing or planned satellite networks.
- b) After review by the BR for compliance with the Radio Regulations, the information is published in the BR IFIC, which is a special publication containing these applications as well as requests for coordination and notices of frequency assignment. The required information is specified in Appendix 4.
- c) The API step is a prerequisite allowing any administration to submit comments on how the new satellite network could interfere with the operation of their own existing or planned satellite networks. If this is the case, they are to respond with their comments within 4 months of publication to the filing administration.
- d) The filing administration is supposed to try to resolve any difficulties raised in these comments by altering the orbit position and/or transmission characteristics of the proposed satellite. This could involve a change in the coverage pattern, power levels, or specific frequency bands. The Radio Regulations require that the filing administration try to bring this to resolution. However, if the administration making the comments does not remove its complaint, the rules do not explicitly obligate the filing administration to do much else.

- e) At the end of the 4-month period of the comments, the BR consolidates the comments received at the end of the 4-month period, and publishes the list of administrations which have sent comments in an API/B special section of a BR IFIC. In any case, the filing administration may move on to the notification phase when 4 months have passed after the publication of the API in the BR IFIC.
- f) Some services commonly used in NGSO satellite networks not subject to coordination are Earth exploration-satellite service, meteorological satellite service, space research service, amateur-satellite service, space operation service, etc. Small satellites, including nano-satellites and pico-satellites, are frequently designed to use frequency bands that are not subject to coordination.

6.3.2 Satellite networks or systems that are subject to the coordination procedure

- g) For satellite networks subject to coordination procedure under Section II of Article 9, the notifying administration must submit filing information as request for initiating the coordination process for the satellite and Earth stations in the network. Coordination is the most critical phase as it determines the priority that the new network will have over new applicants who come later.
- h) The information to be supplied for coordination is contained in Appendix 4. It is very much like the API, except that specific frequency assignments are requested. This can be accommodated by filling in the characteristics of the transponders (center frequencies and bandwidths) along with the basic specifications of typical Earth stations and services.
- i) The rules place the burden of determining which administrations could be affected by the new assignments upon the BR itself. One of the criteria applied for the determination of the affected administration uses the calculation of the percentage increase in equivalent link noise temperature ($\Delta T/T$), defined in Appendix 29. The threshold for coordination is set at 6%. The analysis technique is very conservative in that it will indicate that unacceptable interference could occur even when it would not be the case in practice. The idea is to assure the priority given by the Radio Regulations to any other administration that has a system that meets one of the two conditions cited above.
- j) The requested administration must evaluate the data in the coordination filing to see if the calculated interference levels would be acceptable. Specifically, it must:
 - i) Acknowledge receipt of the data;
 - ii) Examine the data to determine if interference would be caused to its lawful frequency assignments;
 - iii) Within 4 months of receipt, inform the requesting administration of its agreement that the interference is acceptable or its disagreement, giving also the technical details upon which, its disagreement is based, including relevant characteristics about its system not previously notified and its suggestions with a view to a satisfactory solution to the problem.
- k) An affected administration will evaluate the technical characteristics of the proposed satellite network and inform the filing administration if it agrees to its operation.

- l) An administration with which coordination is sought must issue its opinion within 30 days of the final request from the BR; otherwise, it is presumed to agree that no harmful interference would occur.
- m) On the other hand, an administration believing it should have been included in the coordination process can demand the BR that it be allowed to provide its review as well.
- n) Coordination of satellite networks is a bilateral activity where the newcomer must approach the incumbent and obtain their agreement regarding the potential for interference between systems. Such discussions and negotiations will take a year or more, particularly in difficult or acrimonious situations.
- o) Following a successful coordination, a filing administration submits its frequency assignments to the BR for recording purposes. The BR examines the assignment to make sure that it fits the Table of Frequency Allocations and that the coordination procedures have been followed. In particular, the new assignment should not cause unacceptable interference to an existing assignment that has already entered or completed the review and coordination. Although it has not been given policing authority, the BR does have power over administrations because of the status given to frequencies that have been recorded in the Master Register. When a frequency assignment is in coordination between two administrations, the BR can assist by performing calculations of the expected level of interference and can make recommendations to the parties on how the interference could be prevented.
- p) In the event of a deadlock, and provided the BR has already been asked to assist in resolving the conflict, the filing administration can proceed directly to the notification phase. This particular provision provides a means to overcome the kind of obstacle that has been used in the past to attempt to block a competitor. Therefore, the BR would examine these notices with respect to standard technical criteria that assure that appropriate frequencies were chosen and that harmful interference will not occur. A positive conclusion will result in recording of the assignments in the Master Register, indicating the names of administrations with which coordination was successfully completed and those that it was not but where the technical finding by the BR was favourable. This provision happily provides the means to obtain protection where an uncooperative administration would attempt to block the new entrant.
- q) Most of the time, coordination and recording are accomplished in a straightforward manner, taking anywhere from 6 months to 3 years, depending on the number of administrations involved and the complexity of the technical analysis of potential interference.
- r) Notification of frequency assignments, the last step in the regulatory process, should be accomplished before the service is initiated. This is done by submitting the same data items with the characteristics of the satellite network after the completion of coordination. The BR will verify that the entire coordination process is complete with all of the appropriate administrations. If so, they will record the assignments in the Master Register and the new operator is free to begin using them to provide service.

6.4 Terrestrial Coordination of Earth Stations

- a) Terrestrial coordination involves any terrestrial radio transmitter that can potentially radiate signal power across a border into a neighbouring country. In particular, the Radio Regulations and Recommendations provide technical analysis procedures to compute the coordination contour, which is a graphical depiction of the expected and worst-case power levels from a transmitting earth station after propagating through the atmosphere. A neighbouring administration analyses the coordination contour to determine whether or not this level of power could interfere with the operation of domestic radio receivers that employ the same frequency band. If so, then the two administrations would, on a bilateral basis, make an agreement as to which frequencies would be used or how the transmit radiation pattern of the offending Earth station should be altered. After coordination is complete, the administration can register the new frequency assignment with the BR.
- b) Hence, terrestrial coordination is the process intended to protect terrestrial microwave stations in other countries from transmissions by new earth stations that operate in a shared frequency band. The bands where this is required are those where the FSS and the fixed service are coprimary. The aim is to try to control interference along path where the Earth station interferes with the terrestrial station, and path where the inverse situation can exist.
- c) An applicant for a new earth station starts with data that describes the radiation pattern around the full 360° of azimuth along the horizon. This is used to compute the amount of RF energy that could propagate from the earth station location to locations in a neighbouring country where terrestrial receivers could be located. Additional shielding is provided by the existing terrain and buildings around the earth station site.
- d) The mechanism used to perform this assessment is the coordination distance, which is the calculated distance over which interference could potentially result.
- e) This distance is calculated with formulas in Appendix 7 to the Regulations and considers attenuation produced by propagation over the surface of the Earth along the great circle path, which introduces greater path loss than simple line of sight. The techniques are complicated and are best carried out with computer software available for download from the ITU Web site.
- f) Unlike satellite coordination, it is up to the requesting administration (and not the BR) to determine which administrations need to be included—a relatively simple process once the coordination diagram for the new earth station is complete.
- g) An administration that receives the request for coordination, including the coordination contour along with the other information in Appendix 4, must determine if interference could result from the operation of the new Earth station. Receipt of this data must be acknowledged within 30 days of receipt. The examination would consider:
 - Interference to terrestrial stations existing or to be operating before the earth station enters service or within 3 years, whichever is longer;
 - Interference to the earth station by such terrestrial stations.

- h) Each affected administration notifies the requesting administration within 4 months of one of the following:
- Its agreement to the proposed earth station with a copy to the BR;
 - Its desire to include specified terrestrial stations in the coordination;
 - Its disagreement.
- i) In the last two cases, the notification should include a diagram showing the location of existing or planned terrestrial stations within the coordination area (which is the area inside the coordination contour) and suggestions for solving the interference problem. A copy should also be provided to the BR.
- j) In cases where it is difficult to get agreement, the BR can be counted on to provide assistance. They have even been in the position of acting as a neutral party and honest broker in finding the needed solution to the problem.

7. CANCELLATION OF SATELLITE FILINGS

7.1 In the event that the operator of any satellite network causes harmful interference to other satellite networks, administration can instruct the satellite operator to cease transmission immediately and not to resume operation until the cause of the interference is remedied. If the operator is unable to remedy the interference within a defined period, administration may suspend the filing in accordance with No. 11.49 of the Radio Regulations. If within the period of suspension administration is satisfied that the interference has been remedied, administration can permit transmissions to be recommenced and will notify the ITU-BR that the assignment has been brought back into regular use. Otherwise, if at the end of the suspension period the interference has not been remedied and the filing brought back into regular use the filing will be cancelled by the ITU-BR.

7.2 Cancellation of satellite filings may happen in the event that it is established by administration that a satellite network is operating outside either:

- a) its characteristics as recorded in the Master Register; or
- b) in the case where the ITU-BR has not completed the processing of the notice in accordance with Article 11 of the Radio Regulations, the notified characteristics of the satellite network.

7.3 Cancellation of satellite filings may also occur in the event that a satellite either:

- a) suffers an anomaly and as a result is no longer able to operate all, or part of, the assignments notified to the ITU as having been brought into use, or recorded in the MIFR; or
- b) is relocated from the relevant orbital location.

8. SATELLITE COORDINATION AMONG ATU MEMBER COUNTRIES FOR THE IMPLEMENTATION OF RESOLUTION 559 (WRC-19)

8.1 The ITU Constitution guarantees an equitable access for all countries to the orbital and frequency resources of the geostationary arc. This fundamental principal has led to the development of Frequency Plans AP30, 30A for BSS and AP30B for FSS in the C and Ku Band for the developing countries of the Region 1 where Africa is included. However, for various reasons, a good number of countries in Africa have seen their assignments/allotments in the

Plans degraded mostly due to lack of commenting to new systems for additional use filed in terms of Article 4 of Appendices 30 and 30A for BSS plan and Article 6 in Appendix 30B for the FSS plan.

8.2 On the other hand, during the last WRC-19 that took place in Egypt, the **Resolution 559 (WRC-19)**³ was adopted whereby all the affected African countries have been given the opportunity to submit new fillings for their BSS Plan to replace the degraded assignments.

8.3 With this opportunity came new challenges regarding coordination with the systems in the List and assignments in the Plan since after the new assignment were published in Part A of the BRIFIC, the notifying countries are obliged by the ITU Radio Regulation to coordinate with all the countries that have been identified by the ITU-R Bureau as affected before they can submit the Part B of their assignments.

8.4 To overcome this challenge, all the ATU member countries are urged, in the spirit of cooperation and collaboration, to consider the following recommendations in order to facilitate the progress on the coordination of the Res. 559 fillings:

8.4.1 Administrations with affected assignments in the Regions 1 and 3 Plans (identification under § 4.1.1a):

- When an affected administration is a neighbouring country, that affected administration should give its agreement to the notifying administration of affecting Res.559 filing as the new level of EPM values of the assignment in the Plan, after having accepted interference from the affecting Res.559 filing, would still be acceptable.
- When an affected administration is not a neighbouring country but a member of ATU, the beam of the affecting administration should be shaped to avoid affecting assignments in the Regions 1 and 3 Plans.

8.4.2 Administrations with affected assignments of Res.559 filings (identification under §4.1.1b):

- When an affected administration is a neighbouring country, that affected administration should give its agreement to the notifying administration of affecting Res.559 filing as the new level of EPM values of the assignment of Res.559 filing, after having accepted interference from the affecting Res.559 filing, would still be acceptable.

³ See **Resolution 559 (WRC-19)**- Additional temporary regulatory measures following the deletion of part of Annex 7 to Appendix 30 (Rev.WRC-15) by WRC-19

- When an affected administration is not a neighbouring country but a member of ATU, the beam of the affecting administration should be shaped to avoid affecting assignments of other Res.559 filings.

A new level of EPM values is considered as acceptable when the affected administration would still be able to provide services and at the same time continue to be protected from an incoming network.

8.4.3 Administrations with affected Assignments of Regions 1 and 3 List or for which complete RR Appendix 4 information has been received by the Radiocommunication Bureau in accordance with the provisions of § 4.1.3 (identification under §4.1.1 b):

ATU Res.559 Administrations should engage in the coordination, trying to obtain as many agreements as possible. However, for cases, where EPM of assignments in the List is degraded a lot, countries can apply § 4.1.18. The use of § 23.13 to request the exclusion of ATU Member States from the service area of assignments in the List is not advisable. But this § 23.13 could be used to negotiate and obtain an agreement for Resolution 559 filings.

9. SOME PRACTICAL GUIDANCE FOR SATELLITE FILINGS

1	Install BR Space software from BR web site https://www.itu.int/ITU-R/go/space-software/en or from the BR IFIC (Space) DVD https://www.itu.int/en/ITU-R/space/Pages/brificMain.aspx
2	Registration to e-submissions of satellite networks filing https://www.itu.int/ITU-R/go/space-submission
3	Check for completeness and correctness before submission of data to BR
4	Check if PFD hard limit is met before submission to BR
5	Space Plans (see https://www.itu.int/ITU-R/go/space-plans/en)
6	https://www.itu.int/en/ITU-R/seminars/Pages/default.aspx https://www.itu.int/en/ITU-R/space/elearning/Pages/default.aspx

10. INSTITUTIONAL AND ADMINISTRATIVE ARRANGEMENTS

10.1 Institutional

The acquisition, retention and use of satellite resources can only be possible if a country has the right Institutions and governance tools to ensure maximum social-economic impact. These Institutions are generally classified in three main roles namely Policy Making, Satellite resources management and satellite resources utilisation:

10.1.1 Policy Making Institutions and their tools:

The policy for Space sector is usually handled by the Ministry. Depending on the country, this role can be handled in a Ministry responsible for ICT and /or Digital matters or it can be handled by a Ministry responsible for Sciences and Research. The main mandate of such Ministry is to establish a policy that governs the entire Space Sector of the country. Such

policy provides a country vision in Space and establishes a high-level framework or guidance on necessary institutions and stakeholders in the Space Sector and their role. The main tool used for achieving that is a “Space Policy”.

10.1.2 Management of satellite resources institutions and their tools:

The management of satellite resources namely orbits and frequency spectrum are generally handled by Regulatory Authorities either as Independent Institutions or under Ministries depending on countries Laws. Such an institution usually deals with the following tasks:

- a. Protecting national satellite resources by conducting required satellite coordination by the ITU Radio Regulations and Rules of Procedures;
- b. Facilitating satellite operators in the country to acquire satellite resources by filing satellite networks for them and protecting them;
- c. Defending national interests in terms of satellite resources by representing the country in all international forums that discuss satellite mainly all meetings related to the World Radiocommunication Conference;
- d. Ensure long term plan for national satellite resources;
- e. Contributing to global endeavour for ensuring equitable access to satellite resources and their efficient utilisation.

The management of satellite resources usually requires some legal and regulatory tools that include but not limited to the following:

- National Frequency Allocation Table,
- Regulations governing satellite filing and,
- Licensing framework for satellite resources and services.

10.1.3 Satellite resources use Institutions and their tools:

It is one thing acquiring and protecting satellite resources but if there is no strategy for their efficient utilisation, they become a waste for the country and the entire Space Industry. Thus, the establishment of National Space Agencies. The main role of a Space Agency is developing a National Space Strategy in line with the National Space Policy and facilitate their implementation to ensure that space resources are efficiently utilised for providing maximum impact on socio-economic development. Space Agencies also play a critical role in ensuring peaceful use of outer space. The following are the main tools used to achieve that:

- National Space Policy,
- National Space Strategy and,
- Space Law.

10.1.4 A national multi-stakeholder advisory body on space resources management and utilisation:

The three main bodies described above need to be coordinated to ensure that all endeavours in space sector are channelled via priority areas of the country for sustainable development. This role of coordinating and identifying priority areas is handled by a National Space Advisory Body comprising of representatives from main concerned Government Institutions and from key players in private sector. Such body is usually facilitated by a Space Agency. They can sit on quarterly or bi-annually basis and develop resolutions and/or recommendations to be implemented by the Space Agency and/or the Regulatory Authority.

Note: See the African Satellite Strategy for some details (e.g. typical mandate) of the above elements.

10.2 Focal Point of Administration for satellite networks

In order to facilitate the communications with the Radiocommunications Bureau on matter related to satellite filings procedures, administrations may designate a National Focal Point. The Focal Point is a person nominated by the national competent authority. This nomination may be a working arrangement to allow for the information exchange and flow between BR and the administration. In Circular Letters **CR/450** (e-Communications) and **CR/427** (e-Submission of satellite filing networks), BR requested administrations to designate administrations managers in order to get access to the online application. This Administration Manager may also serve as the Focal Point of Administration for satellite networks issues. The designated Administration Manager will authorize access to the system for other Administration users, Operator Manager and Operator users.

Amongst the key tasks of the Focal Point are the following:

- Facilitation of information sharing between BR and the various satellite operators;
- Coordination of the satellite filings and submission to BR;
- Assuring that deadlines for comments and any regulatory procedures are met;
- Participation to BR seminars/training related to satellite issues;
- Regular updating of the table 12A/12B of the Preface to the BR IFIC;
- Being a focal point of a national administration with other administrations in the case of harmful interference.

Any change of the Focal Point must be communicated as soon as possible to the Bureau.

10.3 Core knowledge and skills of Satellite personnel

Satellite Network Coordination is not an easy process as we all know and specialized teams should be trained and equipped with all necessary softwares, in order to be ready to conduct bi-lateral negotiations when it comes to talk about harmful interferences and protection of national satellite networks.

The following knowledge and skills may be required for Satellite personnel:

- Knowledge of the ITU Radio Regulations, Rules of Procedure, relevant ITU-R Recommendations, and its application to space radiocommunication services;
- Advanced university degree in telecommunications/radiocommunications engineering;
- Ability to communicate well;
- Ability to use computer application in particular BR software;
- Experience in the test field measurements as well as the skills in installation of the Earth stations or other communication equipment's, may be useful;
- Knowledge of how Administrations/satellite networks are identified by the Bureau as potentially affected including the criteria applied by the Bureau;
- Knowledge of acceptable levels of interference to be used in negotiation;
- Ability to find a solution/compromise;
- Have the right to take decisions in negotiation;
- Ability to make a link between satellite communications and the Radio Regulations;
- Ability to work with other staff in a coordination team;
- Ability to extract necessary information from the Bureau's databases for coordination.

As it is recommended that ATU Member States should create specialized teams to deal with Satellite Network Filing and Coordination (Cf. Strategy for Optimum Acquisition, Retention and Utilization of Satellite Resources in Africa), a term of references (TOR) should be developed as a

model for African Countries to base to when creating teams and whenever possible take opportunities to exchange experience and enforce capacity building.

11. ANNEX 1 – ITU RADIO REGULATORY FRAMEWORK FOR SPACE SERVICES

Introduction

During the last 56 years, from the Administrative Radio Conference in 1963 and up to and including the last World Radiocommunication Conference, in 2019 (WRC-19), many ITU conferences have addressed the regulation of spectrum/orbit usage by stations of the space radiocommunication services. The ITU Member States have established a legal regime which is codified through the ITU Constitution/Convention, including the Radio Regulations. These instruments 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 on board a geostationary-satellite or for space station(s) on board non-geostationary satellite(s), used or intended to be used in the Master International Frequency Register or by their conformity, where appropriate, with a plan.

The above regulations are based on the main principles of efficient use and equitable access to the spectrum/orbit resources laid down in No. 196 of the ITU Constitution (Article **44**), which stipulates that "*In using frequency bands for radio services, Members shall bear in mind that radio frequencies and any associated orbits, including the geostationary-satellite orbit, are limited natural resources and that they must be used rationally, efficiently and economically, in conformity with the provisions of the Radio Regulations, so that countries or groups of countries may have equitable access to those orbits and frequencies, taking into account the special needs of the developing countries and the geographical situation of particular countries*". As indicated in the above provision, further detailed regulations and procedures governing orbit/spectrum use are contained in the Radio Regulations (RR), which is a binding international treaty (No. 31 of the ITU Constitution).

Specific procedures have been established to ensure international recognition of the frequencies used and to safeguard the rights of administrations when they comply with those procedures.

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 international Radio Regulations 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.

1 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**. 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 is 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. These plans, in which each country has a predetermined GSO orbital position associated with the free use, at any time, of a certain amount of frequency spectrum, together with the associated procedures, guarantee for each country equitable access to the spectrum/orbit resources, thereby safeguarding their basic rights. Such plans govern a considerable part of the frequency bands available for the space communication services.

During the last 50 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 increase is attributable to many factors. These include not only technological progress, but also political, social and structural changes around the world and their impact on the liberalization of telecommunication services, the introduction of non-geostationary-satellite orbit (non-GSO) satellite systems for commercial communications, for scientific purposes such as earth exploration, meteorological, space research, amateur

services, growing market orientation, the change in the way this widening market is shared between private and state-owned service providers and the general globalization and commercialization of communication systems. These elements led the ITU Plenipotentiary Conference (Kyoto, 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 and led to the introduction of new concepts such as administrative due diligence, which applies to some satellite communication services; and simplification of the advance publication information to be provided to initiate the registration process for a satellite network and the suppression of certain orbital position limitations in Annex 7 to Appendix 30 (WRC-19).

2 Allocation structure

2.1 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 forty defined radiocommunication services (Article 1 of the RR). 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 is organized into three Regions of the world (see Figure 1) and is supplemented by assignment and allotment Plans for some bands and services, and/or by mandatory coordination procedures.

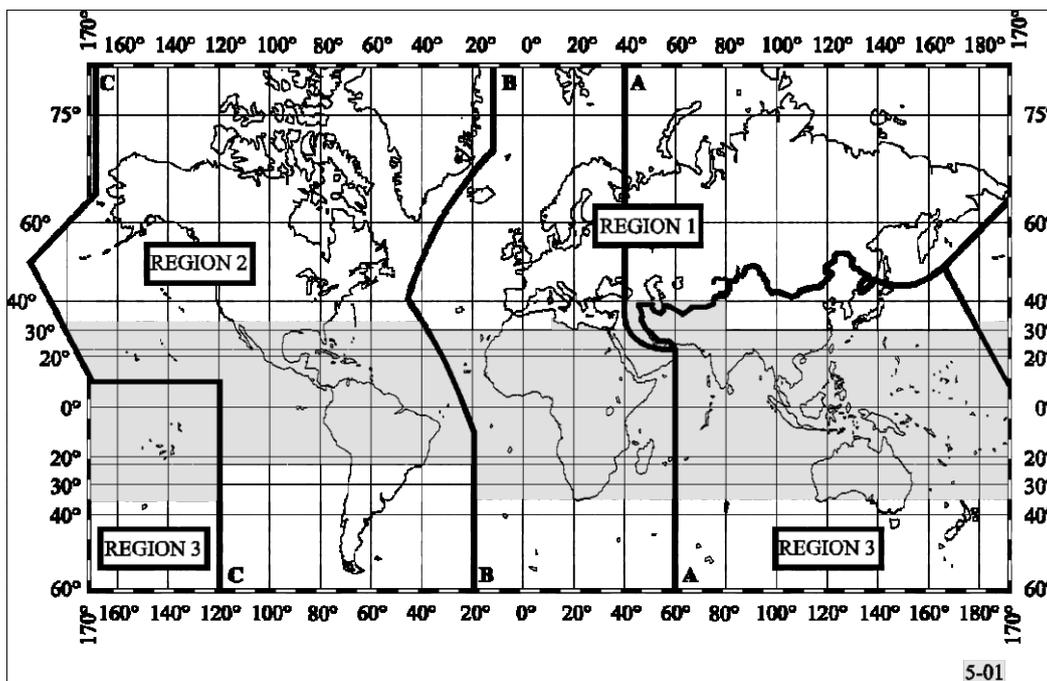


FIGURE 1: Regions for purposes of frequency allocation of the RR

(The shaded part represents the Tropical Zones as defined in Nos. 5.16 to 5.20 and 5.21 of the RR)

2.2 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 licence, 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 licence?
- 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?
- 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?

3 Regulations applying to the use of frequencies and orbits by satellite networks

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 for the sharing of orbit and spectrum resources have been developed and implemented:

- *A priori* planning procedures (applied to networks operating in planned services, 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 contained in Appendix **30B**;
 - the Plan for the broadcasting-satellite service in the frequency band 11.7 - 12.7 GHz (Appendix **30**) and the associated Plan for feeder links in the 14 GHz and 17 GHz frequency bands (Appendix **30A**).
- Coordination procedures (applied to networks operating in planned services 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 Nos. **9.11A** and **9.21** procedures;
- other non-geostationary-satellite networks (all pertinent services and certain frequency bands), for which only the advance publication procedure is required before notification.

4 Procedures applying to non-planned services

Coordination procedures are contained in Article **9** of the Radio Regulations "Procedure for effecting coordination with or obtaining agreement of other administrations". This article contains all elements of the procedures as well as refers 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 the 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 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 (Section I, Article **9**);
- coordination (Section II, Article **9**);
- notification (Article **11**).

The characteristics to be provided for the Advance Publication, Coordination and Notification requests are listed in Appendix **4** of the Radio Regulations and shall be submitted in electronic format together with the graphical information through the Bureau's new online submission system "e-submission of satellite network filings" (<https://www.itu.int/itu-r/go/space-submission>) (see BR circular letter **CR/434** dated 1 August 2018 for more details). To assist Administrations in capturing the required information and validate the completeness of the data, the Bureau has made available the following software tools: SpaceCap, GIMS and BRSIS Validation.

4.1 Advance publication information (API) procedure modified by WRC-19

4.1.1 Before initiating any action under Article **11** in respect of frequency assignments for a satellite network or a satellite system **not subject to the coordination procedure** described in Section II of Article **9, Sub-Section IA**, an administration, or one acting on behalf of a group of named administrations, shall send to the Bureau a general description of the network or system for advance publication in the International Frequency Information Circular (BR IFIC) not earlier than seven years and preferably not later than two years before the planned date of bringing into use of the network or system (see also No. **11.44**).

The notification information may also be communicated to the Bureau at the same time, but shall be considered as having been received by the Bureau not earlier than four months after the date of publication of the advance publication information. The regulatory time limit of 7-year for bringing into use satellite networks or systems not subject to coordination procedure is counted from the date of receipt by the Bureau of the Advance Publication Information.

4.1.2 In case of satellite networks or systems subject to coordination procedure, upon receipt of the complete coordination request information sent under No. **9.30**, the Bureau shall make available, using the basic characteristics of the coordination request, a general description of the network or system for advance publication in a Special Section. The characteristics to be made available for this purpose are listed in Appendix **4**.

4.1.3 The procedure specifies also the cases in which amendments to the information sent in accordance with the provisions of No. **9.1** shall also be sent to the Bureau as soon as they become available. The use of an additional frequency band, or modification of the orbital location for a space station using the geostationary-satellite orbit, the modification of the reference body or the modification of the direction of transmission for a space station using a non-geostationary-satellite orbit, as well as the use of inter-satellite links of a geostationary space station communicating with a non-geostationary space station which are not subject to the coordination procedure under Section II of Article **9**, will require the application of the advance publication procedure.

4.1.4 Upon receipt of the BR IFIC containing information published under No. **9.2B**, 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 within four months of the date of publication of the BR IFIC to the publishing administration responsible for the planned system, with a copy to the Bureau (No. **9.3**).

4.1.5 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 endeavour to cooperate in joint efforts to solve any difficulties, with the assistance of the Bureau, if so requested.

4.2 Procedure for effecting coordination of frequency assignments

4.2.1 Coordination is also another mandatory step in the process leading up to notification of the frequency assignments for recording in the Master Register applicable to

geostationary-satellite networks (in all services and frequency bands) and non-geostationary-satellite networks in certain frequency bands under Nos. **9.11A** and **9.21**. The regulatory time limit of 7-year for bringing into use satellite networks or systems subject to coordination procedure under Section II of Article **9** is counted from the date of submission of the Request for coordination under No. **9.30**. 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 Radio Regulations and on the basis of technical criteria either contained therein (Appendix **5**) or otherwise agreed to by the administrations concerned.

4.2.2 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 listed in Nos. **9.15** to **9.19**), or to the Bureau (space network/space network or space station/terrestrial station coordination listed in Nos. **9.7** to **9.14** and the procedure for seeking agreement in No. **9.21**). 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.

4.3 Requirement and request for coordination

4.3.1 In accordance with the Radio Regulations (No. **9.6**), 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.

4.3.2 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 Radio Regulations (See Rules of Procedures under No. **11.31**).

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.

4.3.3 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 Radio Regulations; and
- is recorded in the Master Register with a favourable 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 Radio Regulations, 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**.

4.3.4 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:

- for GSO/GSO (No. **9.7**), coordination criteria are based on frequency overlap with, coordination arc and/or $\Delta T/T$ or pfd depending on the band;
- for GSO FSS/GSO BSS involving Appendix **30** coordination is required when the power flux-density (pfd) of the GSO FSS network over any portion of the service area of the overlapping frequency assignments of the GSO BSS exceeds specific values given in Annex **4** to Appendix **30**;
- for non-GSO/non-GSO, non-GSO/GSO and GSO/non-GSO (Nos. **9.12**, **9.12A** and **9.13**), coordination is based on frequency overlap;
- for GSO BSS/terrestrial stations (No. **9.11**) 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 frequency 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.

4.3.5 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 Article 9 coordination is required.

4.3.6 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 and the list of satellite networks or systems identified by the Bureau under Nos. 9.12, 9.12A and 9.13 are 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 4 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 No.9.41 and 9.42. In addition to the administrations, satellite networks are also identified under No. 9.7 and except the band 21.4-22 GHz, 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.

4.3.7 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 9.49 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 (Appendix 5).

4.4 Action upon a request for coordination

4.4.1 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 (No. 9.50). 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 (Nos. 9.51 and 9.51A); 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).

4.4.2 If an administration with which coordination is sought under Nos. **9.11** to **9.14** and No. **9.21** fails to respond within the four-month period after the publication, this administration shall be regarded as unaffected and, in the cases of Nos. **9.11** to **9.14**, the provisions of Nos. **9.48** and **9.49** shall apply. Furthermore, for the coordination under Nos. **9.12**, **9.12A** and **9.13**, any satellite networks or systems identified under No. **9.36.1** but not confirmed in the response provided by the administration under No. **9.52** within the same four-month period shall be regarded as unaffected and the provisions of Nos. **9.48** and **9.49** shall apply (No. **9.52C**). Under these provisions, administration which fails to respond is deemed to have undertaken:

- that no complaint will be made in respect of any harmful interference affecting its own assignments which may be caused by the assignment for which coordination was requested; and
- that the use of its own assignments will not cause harmful interference to the assignment for which coordination was requested.

4.4.3 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 (No. **9.52A**).

4.4.4 As indicated above, there is an obligation for the notifying administration to coordinate with any administration which has initiated the coordination process at the same time or at an earlier stage. However, there is also a provision (No. **9.53**) stipulating that both the notifying administration and the objecting administration shall make every possible mutual efforts 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 to that end on the basis of mutual cooperation.

4.5 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.

4.6 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 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 the above paragraphs. In case all 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 only those administrations with agreement could not be obtained.

4.7 Sum up of the RR provisions for processes applicable to non-planned services:

4.7.1 In Section I of Article 9 provisions Nos. 9.1 to 9.2C provide details on the need to undertake the procedure for API on satellite networks or satellite systems that are not subject to the coordination procedure given in Section II of Article 9. Sub-Section IA of Article 9 provides details of the process.

4.7.2 In Section II of Article 9 provisions Nos. 9.6 to 9.21 provide details on the need to undertake the relevant coordination procedure(s). Provisions Nos. 9.23 to 9.31 provide details on initiating the process. It is important to note that the frequency assignments to be taken into account in effecting coordination are identified using Appendix 5 of the RR (No. 9.27 refers).

4.7.3 In Section I of Article **11** provisions Nos. **11.1** to **11.12** provide details on the need to notify. No. **11.15** requires that administrations provide the relevant characteristics listed in Appendix **4** of the IRR. Provisions **11.17** to **11.26A** (noting in particular Nos. **11.17**, **11.22**, **11.23** and **11.25**) provide details on the submission of notices to the BR Provisions **11.27** to **11.43D** provide details on the examination of notices by the BR

4.7.4 Provision No. 11.44 requires that the notified date of bringing into use of any frequency assignment to a space station of a satellite network shall be not later than seven years following the date of receipt by the BR of the relevant complete information under No. 9.1 or 9.2 in the case of satellite networks or systems not subject to Section II of Article 9 or under No. 9.1A in the case of satellite networks or systems subject to Section II of Article 9.

5 Notification and recording (Article 11)

5.1 The Master International Frequency Register

The procedure for notification and recording of space network frequency assignments in the Master International Frequency Register (MIFR) is described in Article **11** of the Radio Regulations. 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.*

5.2 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 specifies 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 (*This notice shall reach the Bureau not earlier than three years before the assignments are brought into use*). In other words,

- if an assignment 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 (submitting its relevant characteristics, as specified in Appendix 4 of the RR) to the Bureau. 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.

5.3 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 *unfavourable* 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 (under No. 11.31 of the RR) is *favourable*, the assignment is *recorded in the MIFR*, or examined further, if appropriate, from the viewpoint of its conformity with the coordination procedures (No. 11.32 of the RR) or with a world or regional allotment or assignment Plan (No. 11.34 of the RR).

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 *favourable*) or is published in PART III-S of the BR IFIC and

returned to the administration (if the finding is unfavourable). 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 under No. **11.41** without completing the coordination or Plan modification procedure and the concerned assignment may be recorded in the MIFR under specific conditions. However, the notifying administration shall indicate to the Bureau that efforts have been made to effect coordination with those administrations whose assignments were the basis of the unfavourable findings under No. **11.38**, without success (No. **11.41.2**).

5.4 Time limits

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. No. **11.44** stipulates that the notified date of bringing into use of any assignment to a space station of a satellite network shall be no later than 7 years following the receipt of the advance publication information under No. **9.1** or **9.2** in the case of satellite networks or systems not subject to Section II of Article **9** or under No. **9.1A** in the case of satellite networks or systems subject to Section II of Article **9**. WRC-12 introduced further precision and defined bringing into use of 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.” On receipt of the information sent under this provision, the Bureau shall make that information available on the ITU website as soon as possible and shall publish it in the BR IFIC. **Resolution 40 (Rev.WRC-19)** shall apply.

WRC-19 defined bringing into use of a frequency assignment to a space station in a non-geostationary satellite orbit or system as contained in Nos. **11.44C**, **11.44D** and **11.44E**. Upon receipt of the information of bringing into use information and whenever it appears from reliable information available that a notified assignment has not been brought into use in accordance with No. **11.44**, No. **11.44B**, No. **11.44C**, **11.44D** or No. **11.44E** as the case may be, the consultation procedures and subsequent applicable course of action prescribed in No. **13.6** shall apply.

5.5 Suspension and Resumption of use of a frequency assignment

Wherever the use of a recorded frequency assignment to a space station is suspended for a period exceeding six months, the notifying administration shall inform the Bureau of the date on which such use was suspended. When the recorded assignment is brought back into use, the notifying administration shall, subject to the provisions of No. **11.49.1** when applicable, so inform the Bureau, as soon as possible. The date on which the recorded assignment is brought back into use shall be not later than three years from the date on which the use of the frequency assignment was suspended, provided that the notifying administration informs the Bureau of the

suspension within six months from the date on which the use was suspended. If the notifying administration informs the Bureau of the suspension more than six months after the date on which the use of the frequency assignment was suspended, this three-year time period shall be reduced. In this case, the amount by which the three-year period shall be reduced shall be equal to the amount of time that has elapsed between the end of the six-month period and the date that the Bureau is informed of the suspension. If the notifying administration informs the Bureau of the suspension more than 21 months after the date on which the use of the frequency assignment was suspended, the frequency assignment shall be cancelled. (Please see No. **11.49**).

When informing the Bureau of the resumption of use of a frequency assignment to a space station in the geostationary-satellite orbit, the information requested in Resolution 40 shall also be submitted to the Bureau. The procedure to resume the use of a suspended frequency assignment is similar to the procedure for bringing into use. Upon receipt of the information of the resumption of use and whenever it appears from reliable information available that a notified assignment has not been brought back into use in accordance with No. 11.49, No. 11.49.1, No. 11.49.2, No. 11.49.3 or No. 11.49.4, as the case may be, the Bureau will apply the consultation procedures and subsequent applicable course of action prescribed in No. 13.6.

5.6 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 request 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, as stipulated under No. **9.53**.

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 programmes 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.

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

6.1 The BSS and associated feeder-link Plans and Lists

6.1.1 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).

6.1.2 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)⁴ ;
 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.

6.1.3 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, modification and additional uses, as appropriate, 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.

6.1.4 The BSS and associated feeder-link Plans are assignment plans. The Plans for Regions 1 and 3 is 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, etc. 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.

⁴ For countries outside Europe.

6.1.5 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 with respect to:

- the Region 2 Plan as it evolves;
- other modifications to the Region 2 Plan not yet coordinated with prior dates of receipt;
- other services in the three Regions having primary allocations in the bands used by the Region 2 Plan;
- the Regions 1 and 3 Plan;
- the existing Regions 1 and 3 List as it evolves; and
- other modifications to the Regions 1 and 3 List not yet coordinated with prior dates of receipt.

The Region 2 Plan has direct strappings between feeder-link and downlink assignments.

6.1.6 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_ALL database, which is distributed in the BR IFIC (space service) and can be downloaded from the ITU website at: <http://www.itu.int/en/ITU-R/space/plans/Pages/AP30-30A.aspx>

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 for 99% of the worst month.

6.1.7 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, e.g. when a new network is added to a List. In accordance with § 4.1.24, the period of operation is 15 years counted from the date of bringing into use or 2 June 2000, whichever is later. This period of operation may be extended by up to 15 years on condition that all the characteristics of the assignment remain unchanged and that the responsible administration shall submit the request to the Bureau at the latest three years before the end of

the first 15-years period of operation. The detailed characteristics of all the assignments in the List are included in the above-mentioned SPS_ALL database.

Proposed additions or modifications to the evolving R1/R3 downlink List are possible and can only enter this List after they have satisfied all coordination requirements in accordance with Article 4 of Appendix 30 with respect to:

- the R1/R3 downlink Plan;
- the R1/R3 downlink List as it evolves;
- other modifications to the R1/R3 downlink List not yet coordinated with prior dates of receipt;
- other services in the three Regions having primary allocations in the bands used by the Regions 1 and 3 downlink Plan;
- the Region 2 downlink Plan as it evolves; and
- other modifications to the Region 2 downlink Plan not yet coordinated with prior dates of receipt.

Proposed additions or modifications to the evolving R1/R3 feeder-link List are possible and can only enter this List after they have satisfied all coordination requirements in accordance with Article 4 of Appendix 30A with respect to:

- the appropriate R1/R3 feeder-link Plan;
- the appropriate R1/R3 feeder-link List as it evolves;
- other modifications to the appropriate R1/R3 feeder-link List not yet coordinated with prior dates of receipt;
- other services in the three Regions having primary allocations in the bands used by the appropriate Regions 1 and 3 feeder-link Plan;
- the Region 2 feeder-link Plan as it evolves; and
- other modifications to the Region 2 feeder-link Plan not yet coordinated with prior dates of receipt.

6.2 Procedure for implementation of Plan or List assignments (Article 5)

6.2.1 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.

6.2.2 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.

6.2.3 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. The only exception is in limited cases listed in provision 5.2.1 d) 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.

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

6.3.1 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.

6.3.2 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.

6.3.3 Procedures for modifications to Region 2 Plan

6.3.3.1 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 8 years but preferably not later than 2 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.

6.3.3.2 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).

6.3.3.3 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/.

6.3.3.4 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 under § 4.2.15 of Article 4 of AP30/30A. 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 8 years from the date of receipt of a submission under § 4.1.3 and 4.2.6 of AP30/30A, they will be cancelled.

6.3.4 Procedures for modifications to Regions 1 and 3 List

6.3.4.1 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, etc., 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.

6.3.4.2 Similarly to modification to Region 2 Plan the submission in Appendix 4 format shall be sent not earlier than 8 years but preferably not later than 2 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.

6.3.4.3 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/or power flux-density limits) to all entries in the Regions 1 and 3 Plan 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 BR IFIC.

6.3.4.4 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. 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. After that four-month period, the notifying administration can request the assistance of the Bureau to obtain the decision of that administration in accordance with § 4.1.10a of Article 4 of Appendix 30/30A.

6.3.4.5 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, there are provisions in paragraphs 4.1.18 to 4.1.20 of Article 4 to enable the matter to 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 under § 4.1.11 of Article 4 of AP30/30A. 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.

6.3.4.6 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 8 years, they will be cancelled.

6.3.5 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.

7 The FSS plan and its associated procedures (Appendix 30B)

7.1 The FSS Plan and the associated List of assignments

7.1.1 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 12-13/10-11 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.

7.1.2 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 7.1.1 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 BR IFIC (space services) and can be downloaded from the ITU website at:

<https://www.itu.int/en/ITU-R/space/plans/Pages/AP30B.aspx>

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% for the 6/4 GHz frequency bands and 99.9% 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.

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

7.2.1 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 later date.

7.2.2 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.

7.2.3 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 § 6.7 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.

7.2.4 After being entered in the List of AP30B, an assignment can be notified in accordance with Article 8 of AP30B for its inclusion into the Master Register. Nevertheless, the further protection of the assignments recorded in the Master Register will be done within the characteristics presented in the List.

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

7.3.1 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 8 years and preferably not later than 2 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.

7.3.2 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 Radio Regulations. Following a favourable finding, the Bureau further evaluates the impact of the proposed assignments on the 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.

7.3.3 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.

7.3.4 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.

7.3.5 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 whose territories are included in the service areas before the assignments are included in the List. The above-mentioned assistance procedure under § 6.13 to § 6.15 of AP30B cannot be invoked by notifying administration to reach this type of agreement.

7.3.6 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, including agreements for inclusion in the service areas. The Bureau checks if required agreements from the identified administrations are obtained (examinations under § 6.19 and § 6.21 of AP30B), taking into account the final characteristics of affected assignments which have been entered in the List between the submissions of Stage A and Stage B of the notice under examination. If the required agreements were not obtained, an unfavourable finding is given to the assignments and the whole notice is returned to the administration. The agreement between two or more administrations may be obtained for a specified period and the concerned assignments shall be maintained in the List until the end of this period. After that date the assignments in the List shall lapse unless the agreement of the affected administrations is renewed. 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 in Stage B submissions. The Bureau calculates and compares the interference caused by the Stage A characteristics and by the Stage B characteristics of the proposed network to the affected networks. If all the examinations lead to favourable 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 unfavourable findings, the submitted notice is returned.

However, if a notice is returned due to unfavourable findings under Annex 4 of AP30B examination with respect to assignments, but the findings with respect to the allotments in the Plan are favourable, 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 (see A.19a of Appendix 4).

7.3.7 If the proposed assignments are not included in the List within 8 years from the date of receipt of a submission under § 6.1 of AP30B, they will be cancelled.

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

7.4.1 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 3 years before the assignment is brought into use.

7.4.2 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, including the Article 11.44B for confirmation of continuous bringing into use, 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 favourable findings. If the examinations lead to unfavourable findings, the assignment is published in Part III-S, and returned.

7.4.3 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.

7.4.4 If the characteristics of the submission under Article 6 and Article 8 are the same, the notifying administration can submit a unique notice under Article 8 and ask the Bureau to examine the notice for both the entry in the List and the notification.

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

7.5.1 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.

7.5.2 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.

7.5.3 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.

7.5.4 The new allotment is then included in the Plan and published in a Special Section (AP30B/A7/) of BR IFIC if the above-mentioned examinations lead to favourable findings.

7.5.5 If affected administrations are identified in this process, the corresponding agreements are required, otherwise the request for a new allotment in the Plan will be treated as a submission under Article 6 of AP30B. If the calculated C/I values of the new allotment are below the required criteria, the requesting administration has to accept the excess degradation.

7.6 Resolution 170 (WRC-19)

7.6.1 WRC-19 established the special procedure described in **Resolution 170 (WRC-19)**⁵ which shall be applied under Article 6 of AP30B:

- for conversion of the allotment into an assignment with modifications outside the envelope of the initial allotment while restricted to providing service to its national territory, or
- for a submission of an additional system the service area of which is limited to its national territory, or
- for a submission by an administration acting on behalf of a group of named administrations of an additional system the service area of which is limited to the national territories of the group of named administrations.

7.6.2 This procedure is aimed to facilitate the process of entering the frequency assignments into the List with relaxed coordination criteria and to enhance equitable access to the FSS Plan frequency bands for the Member States wishing to provide service within their national territories only.

7.6.3 This special procedure can only be applied once by an administration, or one acting on behalf of a group of named administrations, having no assignment in the List of AP30B or an assignment submitted under §6.1 of AP30B.

7.6.4 Specific criteria, as presented in the Appendix 1 to Attachment 1 to Res.170 (WRC-19), shall be used for determining whether an assignment is considered to be affected by networks submitted under this Resolution.

⁵ See Resolution 170 (WRC-19) - Additional measures for satellite networks in the fixed-satellite service in frequency bands subject to Appendix 30B for the enhancement of equitable access to these frequency bands

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

8.1 Following one of the recommendations in the report by the Director of the BR on **Resolution 18 (Kyoto, 1994)**⁶, WRC-97 adopted **Resolution 49**⁷, 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 modifications of the Appendices 30 and 30A Plans and additional uses in the Appendix 30B planned services.

8.2 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 assignments into use, but must in any case no later than 30 days following the end of the period established as a limit to bringing into use in No. 11.44. 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).

8.3 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.

8.4 **Resolution 552 (WRC-12)**⁸ 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 administration 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 of physical satellite network brought into use in this band and this

⁶ See Resolution 18 (Kyoto, 1994) – Review of the ITU’s frequency coordination and planning framework for satellite networks

⁷ See Resolution 49 (Rev.WRC-15) Administrative due diligence applicable to some satellite radiocommunication services

⁸ See Resolution 552 (Rev.WRC-19) - Long-term access to and development in the frequency band 21.4-22 GHz in Regions 1 and 3

satellite ID remains same for the life time of the satellite irrespective of the orbital location of the satellite or its responsible administration till it is deorbited.

The notifying administration shall provide the information requested in Resolution 552 (Rev.WRC-15) within 30 days after the actual commencement, or resumption, of use of the frequency assignments.

Within 30 days after the end of the 7-year regulatory period, and after the end of the three-year period following the date of suspension under No. 11.49, if the complete information under Resolution 552 is not yet received by the Bureau, the corresponding frequency assignments shall be cancelled by the Bureau.

8.5 As a conclusion:

In the majority of cases for proposed networks in FSS, MSS and BSS the submission of due diligence information to the ITU-BR is required in accordance with ITU Resolution 49 of the RR that requires Administrations to obtain certain information from operators on their Satellite Networks.

The information should be provided to the ITU-BR as early as possible before bringing into use of the frequency assignment, but no later than 30 days following the end of the period established as a limit to bringing into use in No. 11.44.

9 Bringing into Use (BiU)

9.1 Where notification occurs before an administration brings the assignments into use, the administration must inform the ITU-BR within 30 days of the date when the network's frequency assignments have been brought into use. (See No. 11.47 of the Radio Regulations).

9.2 The time limit is eight years for planned services in Appendices 30 and 30A and 30B, and seven years for non - planned services. The due diligence must be submitted no later than 30 days following the end of the 7-year period or 8-year, as appropriate.

10 Cost recovery

10.1 In accordance with **Resolution 88 (rev Marrakech, 2002)**⁹ of the Plenipotentiary Conference and Council **Decision 482**¹⁰, cost recovery is to apply to satellite network filings received by the Bureau after 7 November 1998. Additionally, WRCs 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.

10.2 The cost recovery for satellite network filings is consistent with the general principles for cost recovery adopted in **Resolution 91 (Minneapolis, 1998)**¹¹, in particular *resolves* 4 and the

⁹ See Resolution 88 (Rev. Marrakesh, 2002) - Processing charges for satellite network filings and administrative procedures

¹⁰ See Council Decision 482 (Modified 2020) - Implementation of cost recovery for satellite network filings

¹¹ See Resolution 91 (REV. Guadalajara, 2010) - Cost recovery for some ITU products and services

need to ensure that no more than the actual costs of providing products and services are recovered: <http://www.itu.int/ITU-R/go/space-cost-recovery/en>

10.3 It's applicable for the production of the special sections of the BR IFIC (space services) concerning advance publication(API), and their associated requests for coordination (Article 9 of the RR) and requests for modification of the space service plans and lists contained in Appendices 30, 30A and 30B to the RR. It's also applicable to all satellite network filings concerning notification for recording of frequency assignments in the MIFR (Article 11 of the RR, Article 5 of Appendices 30/30A to the RR and Article 8 of Appendix 30B to the RR).

10.4 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.

10.5 Publication of special sections or Parts 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.

10.6 In accordance with the provisions of ITU Council Decision 482, as amended, the ITU charges fees for processing satellite network filings on a cost recovery basis. The ITU issues the required invoices then send it to the administration.

10.7 Administration accordingly will take all necessary actions to ensure that the payment is made to the ITU.

10.8 If payments are not received by the ITU in accordance with the provisions of Council Decision 482, as amended, the ITU-BR will cancel the filing(s), after informing the concerned administration.

10.9 Each administration has the right to nominate one filling per year free entitlement of Cost recovery required from ITU.

11 Satellite Operators obligations and Requirements

11.1 Administration could ask satellite operators before bringing into use of file to provide the following information:

- Written confirmation of a successful launch (where a new satellite is being used to bring into use the relevant frequency assignment(s)).
- Confirmation of the frequency assignment(s) intended to be brought into use.

11.2 In addition to the information required above, the operator shall provide, at the request of administration, when requested by the ITU-BR, additional information regarding the satellite network. This additional information may include:

- The commercial name of the satellite;
- A manufacturer-provided and certified frequency plan for the satellite, and information on the payload description (for example block diagram, frequency plan, travelling wave tube amplifier (TWTA) power, number of transponders, transponder bandwidth, and expected orbital mission life (OML));
- The results of the in-orbit payload/transponder tests performed upon delivery of the satellite;
- The satellite network operator's license application to the administration; and
- The transponder lease contracts.

11.3 Satellite operator will provide to administration annual progress reports for each satellite network indicating any variations from the previously submitted business plan and also details of their coordination progress and status. Such reports should contain, at a minimum:

- Project activities undertaken, or completed;
- Frequency coordination activities undertaken, or completed, in the previous months;
- Information about any changes or updates to the latest version of the business plan submitted to notifying administration.

11.4 Once the relevant assignment(s) is recorded in the MIFR and brought into use, the operator will provide administration with annual reports covering the operational status of the assignment(s). The operator will provide these reports to notifying administration every year for the lifetime of the assignment(s).

12 Conclusions

“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”.

13 References

- ITU Constitution, Collection of the Basic Texts of the International Telecommunication Union adopted by the Plenipotentiary Conference, <https://www.itu.int/pub/S-CONF-PLEN-2011>
- ITU Radio Regulations, Edition of 2016 <http://www.itu.int/pub/R-REG-RR/en>
- Final Acts WRC-15: <http://www.itu.int/pub/R-ACT-WRC.12-2015/en>
- Preface to the BR IFIC (Space services): <http://www.itu.int/ITU-R/go/space-preface/en>
- ITU-R Space Services Department (SSD): <http://www.itu.int/ITU-R/go/space/en>
- Space Network List (SNL) online: <http://www.itu.int/ITU-R/go/space/snl/en>

- Space Network System (SNS) online: <http://www.itu.int/sns/>

ANNEX 2 – REFERENCES AND AVAILABLE RESOURCES

References for Satellite Filing and Coordination Process

1.1 The detailed coordination and notification procedures in Articles **9** and **11** of the RR are complemented by provisions in other Articles of the RR, in the relevant Appendices and in related Resolutions decided by World Radiocommunication Conferences (WRCs).

1.2 The publication of BR IFIC is distributed to all administrations through DVDs. It contains Parts I-S, II-S, III-S and Special Section publications with information on the frequency assignments to space stations, earth stations or radio astronomy stations submitted by administrations to the BR for coordination, as necessary, and eventual recording in the Master International Frequency Register (MIFR), as well as those submitted under the relevant provisions of the RR or subject to Appendices **30**, **30A** and **30B** of the RR:

- Appendix **30** – Provisions for all services and associated Plans and List for the broadcasting-satellite service in the frequency bands 11.7-12.2 GHz (in Region 3), 11.7-12.5 GHz (in Region 1) and 12.2-12.7 GHz (in Region 2);
- Appendix **30A** – Provisions and associated Plans and List for feeder links for the broadcasting satellite service (11.7-12.5 GHz in Region 1, 12.2-12.7 GHz in Region 2 and 11.7-12.2 GHz in Region 3) in the frequency bands 14.5-14.8 GHz and 17.3-18.1 GHz (in Regions 1 and 3), and 17.3-17.8 GHz (in Region 2);
- Appendix **30B** – Provisions and associated Plan for the fixed-satellite service in the frequency bands 4 500-4 800 MHz, 6 725-7 025 MHz, 10.70-10.95 GHz, 11.20-11.45 GHz and 12.75-13.25 GHz.

1.3 The Preface to the BR IFIC is published and updated regularly on the BR IFIC DVD-ROM and on the ITU website at <http://www.itu.int/en/ITU-R/space/Pages/prefaceMain.aspx>. It describes the contents and the layout of the BR IFIC. It is also for use in consulting copies of the MIFR when provided in electronic form (srs_xxxx.mdb) or the BR IFIC data (ificxxx.mdb) or any other document of the BR.

1.4 Each BR IFIC has a publication date and a 4-month period to confirm the need for coordination with the filing administration. In most cases if no comment confirming the need to coordinate is received from an administration identified by the BR within the 4-month deadline, that administration is considered to have agreed to the filing.

1.5 However, this does not apply to planned services as detailed in Appendices **30**, **30A** and **30B** of the RR. For Appendices **30** and **30A** the filing administration can seek the assistance of the BR and if, after the intervention by the BR a potentially affected administration continues to not reply, it is deemed to have agreed to the requested coordination.

1.6 For Appendix **30B**, failure to reply, even after an intervention by the BR, is deemed to be lack of agreement to the requested coordination. Additionally, for Appendix **30B**, a non-response from an identified administration is considered as disagreement to the inclusion of its territory in the

intended service area of the planned FSS satellite network (No. 6.6 of Appendix 30B and the related Rules of Procedure refer).

1.7 The BR has developed a series of software tools that are to be used when preparing electronic filings and performing technical calculations. They are to be used by operators when developing material for submission to the administration. These tools are regularly updated and new tools are developed depending on the decisions of WRCs. See <http://www.itu.int/ITU-R/go/space-software/en>.

1.8 Circular Letters concerning Radio Regulation Frequency Registration can be found at <https://www.itu.int/md/R00-CR-CIR/en>.

ITU-R Recommendations

The two following ITU-R Recommendations contain the key concepts to be used during a coordination process of a satellite network/system. While they are more focused on geostationary satellite systems, most of these principles can be adapted for non-geostationary satellite systems:

- [Recommendation ITU-R S.740 – Technical coordination methods for fixed-satellite networks](#)
- [Recommendation ITU-R S.1254 – Best practices to facilitate the coordination process of fixed-satellite service satellite networks](#)

Training material in Space Services

Documents submitted by the Radiocommunication Bureau to the World Radiocommunication Seminar (WRS) are the most up-to-date presentations about the various regulatory procedures related to satellite filing and coordination. Since the last WRS was held in December 2020, the consultation of the following documents is recommended:

Subject	Question/Issue	Source of information
Technical analysis for coordinating satellite networks	Analysis of compatibility between GSO satellite networks.	(document WRS20/12)
	Calculation of probability of harmful interference between space networks (C/I ratios).	(document WRS20/13)
How to use the space Plans?	BSS and associated feeder-link Plans and Lists	(document WRS20/18)
	The fixed-satellite service Plan (Appendix 30B)	(document WRS20/17)
Procedures for non-geostationary satellites not subject to coordination	Regulatory requirements and procedures for satellite networks or systems that are not subject to the coordination procedure under Section II of Article 9	(document WRS20/30)

Subject	Question/Issue	Source of information
How to submit a filing to the BR?	e-Submission of Satellite Network Filings	(document WRS20/27)
Means provided by ITU to communicate with the BR and other administrations engaged in satellite coordination	e-Communications	(document WRS20/4)
How to request assistance from the BR during all these procedures?	Technical and regulatory assistance	(document WRS20/6)
How to complete the coordination process?	The notification and recording of frequency assignments in the space services	(document WRS20/16)
	Bringing into use and suspension of space services frequency assignments recorded in the Master International Frequency Register and not subject to a Plan	(document WRS20/29)

Online resources

WRS-20 presentations and video recordings - World Radiocommunication Seminars (WRS) provide the most complete and updated presentations of space regulatory procedures and tools that the Bureau is delivering. The last WRS was held virtually from 30 November to 11 December 2020.

WRS-20 Plenary Sessions

The ITU has compiled the collection of the videos and presentations made during the plenary sessions of the WRS-20 and is presenting them again, in all six ITU languages, as the 'Best of WRS-20' on-demand webinar at: <https://www.itu.int/bestofwrs/>

WRS-20 Space Workshops

- Training Material (see <https://www.itu.int/en/ITU-R/space/Pages/wrs2020SpaceWorkshopMorning.aspx>)
- Specific videos (see <https://www.itu.int/en/ITU-R/space/Pages/wrs2020SpaceWorkshopVideo.aspx>)
- Webcast (see <https://www.itu.int/en/ITU-R/information/events/webcast/Pages/default.aspx>) (NB: English only, TIES protected)

BR Space Software

All BR space software necessary to capture, validate or consult satellite filings are freely available at the BR Space networks and related software webpage:

<https://www.itu.int/en/ITU-R/software/Pages/space-network-software.aspx>

A number of software are accompanied with tutorials and videos.

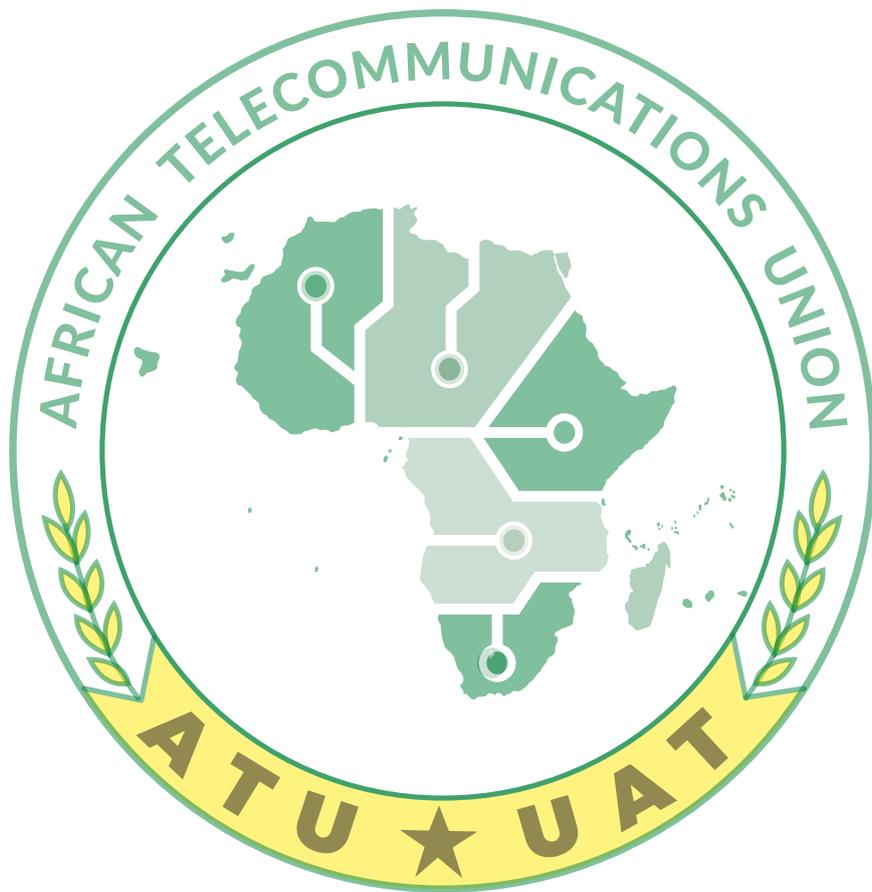
ABOUT THIS HANDBOOK

Development: This handbook was developed by an ATU Task Group on Satellite Resources from December 2020 to July 2021. This group was led by the following:

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Validation: This handbook was validated by a validation forum that was held from 30 to 31 August 2021. The forum was led by the following bureau:

- **Chair:** Valéry Hilaire OTTOU (Cameroun representing ECCAS)
- **Vice-Chair:** Ahmed BORAUD (Niger representing ECOWAS)
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