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## **Space Services Department**

### **BSS AND ASSOCIATED FEEDER-LINK PLANS AND LISTS**

#### **1 Introduction**

Appendices **30** and **30A** to the Radio Regulations contain downlink 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).

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)<sup>1</sup>;  
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.

#### **2 Downlink and feeder-link Plans (Appendices 30 and 30A)**

##### **2.1 Downlink Plans**

Following the deliberations of two former ITU World/Regional Administrative Radio Conferences (1977 for Regions 1 and 3 and 1983 for Region 2), the 1985 Conference (WARC ORB-85) adopted within an integrated regulatory framework two downlink Plans for the three ITU Regions. There is

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<sup>1</sup> For countries outside Europe.

one downlink Plan for Regions 1 and 3 and another for Region 2. These downlink Plans were included in the former Appendix 30 of the Radio Regulations, subsequently renumbered to Appendix S30 by WRC-97 and now back to Appendix 30 (i.e. without the "S") in the current edition of the Radio Regulations.

The Appendix 30 downlink Plans apply to frequency allocations for the BSS in the 12 GHz band. The Regions 1 and 3 Plan is conceptually different from the Region 2 Plan owing to the fact that they were adopted and revised at different Conferences, which had different motivations.

The Regions 1 and 3 and Region 2 Plans are presented in a tabular form in Articles 11 and 10 respectively of Appendix 30. The regulatory procedures associated with the Plans are contained in the Articles of that Appendix. They apply to Plan implementation and modification as well as sharing with respect to terrestrial and other space services in the frequency bands of Appendix 30. Several technical annexes exist containing sharing criteria, calculation methods, and technical data relating to the Plans.

### 2.1.1 Regions 1 and 3 downlink Plan

The Regions 1 and 3 downlink Plan (R1/R3 downlink Plan) covers the frequency bands 11.7-12.5 GHz in Region 1 and 11.7-12.2 GHz in Region 3. It has its origins at the WARC BCSAT-77 Conference and is a detailed *a priori* plan where satellites are generally uniformly spaced in the orbit (usually at 6° spacings) to provide each broadcasting service area with an equal number of 27 MHz channels. Under the Plan, each country was generally given the possibility to make use of five analogue channels on the basis of one beam for national coverage. The Plan had been regarded as “a marvel of engineering ingenuity” however critics found it lacking in commercial viability, claiming that allocating five channels to a single satellite which beams to a single country was not a sound basis for implementation.

The 1997 World Radiocommunication Conference (WRC-97) updated parameters for the Plan in order to modernize it to reflect technological changes. It also added channels for 44 “new countries”<sup>2</sup> and deleted some channels related to countries that have changed their administrative situation in the meantime. While the new parameters facilitated entry of additional capacity in the Plan (through the modification procedure) they still led to a significant increase in the demand for additional channels. WRC-97, in its Resolution 532, resolved to establish an Inter-conference Representative Group (IRG) to study the feasibility of increasing the minimum assigned capacity for countries in the Regions 1 and 3 Plan to around the equivalent of ten analogue channels. The results of these studies were submitted to WRC-2000. They showed that it was possible to increase the capacity of the Plan.

WRC-2000 developed a new Plan that increased the capacity for each country to the equivalent of 10 analogue channels in Region 1 and to the equivalent of 12 analogue channels in Region 3 utilizing digital modulation.

With the uptake of direct satellite broadcasting in Regions 1 and 3 as well as the potential for the future delivery of multimedia services, the WRC-2000 Plan is considered to provide the capacity to meet current and prospective demand. The Plan should secure an economic capacity for each country to take up whenever market conditions are suitable without the fear of a shortage of spectrum in bands that are in high demand from rapidly growing space-based systems and a host of other services.

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2 Countries that had administrative or geographical changes.

The WRC-2000 Plan for Regions 1 and 3 is for national assignments only. 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 Appendix 30, 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.

### **2.1.2 Region 2 downlink Plan**

The Region 2 downlink Plan covers the frequency band 12.2-12.7 GHz. It was adopted at the 1983 Regional Administrative Radio Conference (RARC SAT-83) and incorporated in the Radio Regulations. Its purpose is to provide administrations with channels and orbital positions (based on a non-uniform spacing) to meet their requirements up to the maximum capacity available in the Plan.

It is an *a priori* plan in which a certain degree of flexibility is provided by means of the concept of interim systems that may be implemented with characteristics that can deviate from those contained in the Plan. Another interesting feature of the Region 2 BSS Plan that adds to its efficiency is the group/cluster concept.

The cluster concept was introduced to the Region 2 Plan to overcome internal interference problems caused by reduced cross-polar discrimination between odd and even channels during heavy rainfall. The cluster is simulated in the Plan by using the same beam name at two different orbital positions (usually separated by 0.4 degrees).

The group concept was introduced in the Region 2 Plan to combine grouped assignments in order to allow simultaneous transmissions from one orbital position to several different coverage areas. In general, the internal interference between beams belonging to the same group is ignored. However, when two beams belong to the same cluster, the interfering effect between the two beams is taken into account.

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 Appendix 30 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.

## **2.2 Feeder-link Plans**

The Appendix 30A feeder-link Plans apply to FSS frequency allocations in the 14 GHz and 17 GHz bands. The feeder-links for both downlink Plans were also adopted at different conferences.

The feeder-link Plan for Region 2 in the frequency band 17.3-17.8 GHz was adopted together with its associated downlink Plan during the RARC SAT-83 Conference and incorporated into the Radio Regulations at the WARC ORB-85 Conference. There is thus direct strapping between Region 2 assignments in the feeder-link and downlink Plans.

Proposed modifications to the Region 2 feeder-link 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 Appendix 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 feeder-link Plans for Regions 1 and 3 (R1/R3 feeder-link Plan) in the frequency bands 14.5-14.8 GHz and 17.3-18.1 GHz were adopted at the WARC ORB-88 Conference, several years after the corresponding downlink Plan was adopted. It was further revised at WRC-97 and WRC-2000 based on the planning principles, technical criteria and assumptions mentioned in Section 2.1.1 above.

All feeder-link Plans and their associated regulatory procedures and technical annexes are contained in Appendix 30A of the Radio Regulations.

### **3 Downlink and feeder-link Lists for Regions 1 and 3**

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 Appendices 30 and 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 Appendices 30 and 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 initial Lists were annexed to Resolution 542 (WRC-2000).

The Lists are evolving and are updated and published periodically by the Bureau, e.g. when a new network is added to a List.

#### **3.1 Downlink List**

The Regions 1 and 3 downlink List of additional uses (R1/R3 downlink List) was initially presented in a tabular form in Part 1 of Annex 2 of Resolution 542 (WRC-2000). The regulatory procedures associated with the List are contained in the Articles of Appendix 30. They apply to modification procedures as well as sharing with respect to terrestrial and other space services in the frequency bands of Appendix 30.

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.

### **3.2 Feeder-link List**

The Regions 1 and 3 feeder-link List of additional uses (R1/R3 feeder-link List) was initially presented in a tabular form in Part 2 of Annex 2 of Resolution **542 (WRC-2000)**. The Regulatory procedures associated with the List are contained in the Articles of Appendix **30A**. They apply to modification procedures as well as sharing with respect to terrestrial and other space services in the frequency bands of Appendix **30A**.

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.

## **4 Compatibility between Plan and List assignments**

The approach taken to ensure compatibility between Plan and List assignments is based on the aggregate interfering effect from all “existing” and “virtual” (e.g. included in the Plan but not operational) interfering sources.

The Plans are generally based on a set of reference technical parameters such as a standard e.i.r.p., a reference earth station receiving antenna, elliptical beams, test points usually placed within the –3 dB antenna contour, a reference bandwidth (27 MHz in Regions 1 and 3, 24 MHz in Region 2), a predetermined value of  $C/N$ , and predetermined co-channel/adjacent-channel protection ratios. Further details can be found in Annexes 5 and 3 of Appendices **30** and **30A** respectively and more explanation can be found in the MSPACE software manual.

### **4.1 Regions 1 and 3 Plan and List**

The assessment of interference between Regions 1 and 3 Plan and List assignments is based on the concept of Equivalent Protection Margin (EPM). The downlink and feeder link are considered as separate. The aggregate  $C/I$  is calculated for each wanted channel at each test point with respect to co-channel and first-adjacent channel unwanted assignments located within 9 degrees of the wanted

assignment. EPM is then calculated for the wanted channel at each test point. A wanted channel is considered as being affected if the EPM at a test point falls more than 0.45 dB below 0 dB, or, if already negative, more than 0.45 dB below that value.

The EPM is given by the expression:

$$\text{EPM} = -10 \log \left( \sum_{i=1}^3 10^{(-M_i/10)} \right) \quad (\text{dB})$$

where:

$$M_i = \text{protection margin} = \frac{C}{I_{i_{agg}}} - PR_i \quad (\text{dB})$$

$i$  = interference type (1 = co-channel, 2 and 3 = upper and lower adjacent channels);

$PR_i$  = protection ratio for a given interference type  $i$ .

## 4.2 Region 2 Plan

The assessment of interference between Region 2 Plan assignments is based on the concept of Overall Equivalent Protection Margin (OEPM). The downlink and feeder link are considered together. The overall aggregate  $C/I_{\text{downlink}}$  is first calculated for each wanted downlink channel at each downlink test point with respect to co-channel, first-adjacent channel and second-adjacent channel unwanted assignments. The worst feeder-link  $C/I$  value from the feeder-link test points is selected and combined with the aggregate  $C/I_{\text{downlink}}$  at each downlink test point to evaluate the overall aggregate  $C/I$  for co-channel, first-adjacent and second-adjacent channels. OEPM is then calculated for the wanted channel at each downlink test point. A wanted channel is considered as being affected if the OEPM falls more than 0.25 dB below 0 dB, or, if already negative, more than 0.25 dB below that value.

The OEPM is given by the expression:

$$\text{OEPM} = -10 \log \left( \sum_{i=1}^5 10^{(-M_i/10)} \right) \quad (\text{dB})$$

where:

$$M_i = \text{overall protection margin} = \frac{C}{I_{i_{agg}}} - PR_i \quad (\text{dB})$$

$i$  = interference type (1 = co-channel, 2 and 3 = upper and lower first-adjacent channels, 4 and 5 = upper and lower second-adjacent channels);

$PR_i$  = protection ratio for a given interference type  $i$ .

## 5 Main regulatory aspects

### 5.1 Procedure for implementation of Plan or List assignments

The procedure of Article 5 of Appendices 30 and 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. 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 Appendix 30 or Article 9 or 9A of Appendix 30A are satisfied.

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 Appendices **30** and **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.

## **5.2 Procedures for modifications to the Region 2 Plan or Regions 1 and 3 List**

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.

### **5.2.1 Region 2 Plan**

The modification procedures for the Region 2 Plan are stipulated in Section 4.2 of Article 4 of Appendices **30/30A**. 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 Appendices **30** and **30A** 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 Appendix **30** and § 5 of Annex 1 of Appendix **30A**. These examinations identify administrations whose services are considered to be affected. This information is published in a special section of the International Frequency Information Circular (BR IFIC). 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 following the publication of the special section. If an affected administration has not commented within the four-month period, it is deemed to have agreed to the proposed assignment.

If agreements have been reached with all objecting administrations, the administration proposing the new or modified assignment 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. Once the Article 4 procedure is completed, the modification is added to the Plan and the reference situation is updated. The database containing the technical characteristics and reference situation for all Region 2 Plan assignments can be found on the ITU website at:  
<http://www.itu.int/en/ITU-R/space/plans/Pages/AP30-30A.aspx>

### **5.2.2 Regions 1 and 3 List**

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.

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 Appendix **30** and § 4 of Annex 1 of Appendix **30A** (EPM and 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 Appendix **30** and § 5 and 6

of Annex 1 of Appendix **30A**. This information is published in a special section of the International Frequency Information Circular (BR IFIC).

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 following the publication of the special section. If an affected administration has not commented within the four-month period, it is deemed to have NOT agreed to the proposed assignment. The administration proposing the new or modified assignment may request the Bureau to assist in accordance with 4.1.10a of Article **4**. The Bureau shall send a reminder to the administration which has not commented, requesting for a decision on the proposed assignment. If no reply is received within 30 days of the reminder, it shall be deemed that the administration which has not given a decision has agreed to the proposed assignment. If agreements have been reached with all administrations, the administration proposing the new or modified assignment may continue with the appropriate procedure under Article **5**. Once the Article **4** procedure is completed, the assignment is added to the List and the reference situation is updated. 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.

In cases where an agreement cannot be reached between administrations, there are provisions in paragraphs 4.1.17 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.

The database containing the technical characteristics and reference situation for all Region 1 and 3 Plan and List assignments, can be found on the ITU website at:

<http://www.itu.int/en/ITU-R/space/plans/Pages/AP30-30A.aspx>.

### **5.3 Other regulatory provisions**

#### **5.3.1 Article 2A**

WRC-2000 included provision 2.2 in Article **2** of Appendices **30 & 30A** to provide a coordination mechanism for the use of the guardbands of Appendix **30/30A** to provide Space Operation Functions (SOF) in support of the operation of planned BSS networks. The provision came into effect on 3 June 2000. WRC-03 reviewed the requirements for the use of the guardbands and introduced a new Article **2A** into Appendices **30** and **30A**. The new provision entered into force on 5 July 2003. WRC-07 further reviewed Article **2A** and clarified certain aspects. The revised provisions entered into force on 17 November 2007.

The main aspects of Article **2A** are as follows:

- Advance publication information (API) is not required to be submitted.
- Incoming SOF assignments are to be coordinated with Plan/List/Article 4 assignments using the provisions of Article **7** of Appendices **30** and **30A**.
- For the downlink, coordination among SOF assignments and services not subject to a Plan shall be effected using the provisions of Nos. **9.7, 9.17, 9.18** and the associated provisions of Section II of Article **9**, or § 4.1.1 d) or 4.2.3 d) of Article **4** of Appendix **30**, as appropriate. Coordination of modifications to the Region 2 Plan or assignments to be included in the Regions 1 and 3 List with SOF assignments shall be effected using § 4.1.1 e) or 4.2.3 e), as appropriate, of Article **4** of Appendix **30**.
- For the feeder-link, coordination among SOF assignments and services not subject to a Plan shall be effected using the provisions of Nos. **9.7, 9.17, 9.17A, 9.18**, and the associated provisions of Section II of Article **9**, as appropriate. Coordination of modifications to the



Region 2 feeder-link Plan or assignments to be included in the Regions 1 and 3 feeder-link List, with SOF assignments shall be effected using § 4.1.1 d) of Article 4 of Appendix 30A.

- SOF assignments are notified under Article 11.
- Any SOF assignment supporting an Article 4 assignment shall be brought into use within the regulatory time-limit applicable to the corresponding Article 4 assignment. WRC-15 clarified that the time-limit for bringing into use should be established at the time when the request is received under § 2A.1.4 of Article 2A.
- Any SOF assignment for the initial Plans (Region 2 Plans incorporated in the Radio Regulations at WARC Orb-85 and the Regions 1 & 3 Plan adopted at WRC-2000), shall be brought into use within the regulatory time-limit referred to in § 4.1.3 or § 4.2.6 of Article 4 from the date of receipt by the Bureau of the complete Appendix 4 data.
- In the case where the associated BSS assignments have already brought into use, the SOF assignment must be brought into use within 8 years from the date of receipt of the complete Appendix 4 data.
- Section II of Article 23 does not apply to SOF downlink assignments.
- The provisions of Resolution 49 (Rev.WRC-03) do not apply to SOF supporting the BSS and the associated feeder-link submitted under Article 2A of Appendices 30 and 30A.
- Use of the coordination arc of Appendix 5 (WRC-03) was extended to include Article 2A submissions. WRC-15 clarified that the threshold/condition specified for the FSS/BSS in the frequency bands listed in 2) of Table 5-1 of Appendix 5 also applies to the guardbands in the 14 GHz frequency band.

### 5.3.2 Articles 6 and 7

Articles 6 and 7 of Appendices 30 and 30A deal with the regulatory procedures applicable to the terrestrial, non-planned BSS and fixed-satellite services in order for these services to protect the assignments in the Plans or Lists.

## 6 Actions of the Bureau post WRC-15

### 6.1 Processing of notices submitted under Appendices 30 and 30A

WRC-15 adopted revised provisions for the Plans of the broadcasting-satellite service (BSS) and associated feeder links, as contained in Appendices 30 and 30A (Rev.WRC-15). The Bureau is using the revised provisions in its technical examinations and is publishing on a regular basis Special Sections in the BR IFIC, that contain the filed satellite network characteristics and results of technical examination. The latest reference situations (EPM/OEPM) resulting from these examinations are contained in the SPS database, which is distributed on the BR IFIC or may be downloaded from the ITU “Space Plans” website.

### 6.2 Space Plans System (SPS) database

As part of a program to store Planned and non-Planned satellite network data in a consistent format to facilitate data capture, viewing, searching and publishing, the Space Plans Systems (SPS) database was established. The SPS database (MS Access 2000 format) is an extension of the SNS database and contains the technical characteristics and reference situation (EPM/OEPM) for the Appendix 30 and 30A Plans and List and for pending Article 2A and Article 4 networks. A revised database structure (Version 7) was released in January 2013. An updated database structure (Version 8) taking into account WRC-15 outcomes will be released in January 2017.

In order to properly view the database, the latest versions of SpaceCap, SpaceQry or SpacePub software is required. The SPS software suite is used to perform a technical compatibility analysis on the satellite networks contained in the SPS database. With respect to the technical analysis of compatibility with other services and assignments of other regional Plans/List, the GIBC software is used on the satellite networks contained in the SPS and SNS databases.

The SPS database also contains the technical characteristics of frequency assignments published under Article 5 of Appendices 30 and 30A and entered into the Master Register (MIFR).

### **6.3 Implementation of Resolution 548 (Rev.WRC-12): Application of the grouping concept in Regions 1 and 3**

In response to concerns raised about the use of the grouping concept as it was applied in Appendices 30 and 30A in Regions 1 and 3, WRC-03 developed and adopted Resolution 548, which describes the grouping concept and its limited application in Regions 1 and 3 on a network basis (network grouping). The grouping of networks separated by more than 0.4° in the geostationary arc is not permitted in the List except for application of § 4.1.27. However, grouping of networks separated by more than 0.4° may be used before the inclusion of the assignments in the List to modify the orbital position of a network.

Application of the grouping concept in Regions 1 and 3 is further explained in Articles 11 and 9A of Appendices 30 and 30A. Based on this concept, when calculating interference to assignments that are part of a group, only the interference contributions from assignments that are not part of the same group are included. Moreover, in accordance with *resolves* 5 of that Resolution and the Rule of Procedure relating to § 4.1.1 a) and 4.1.1 b) of Appendices 30 and 30A, for the identification of affected administrations, each network in a group is examined separately without taking into account the other networks in the group.

### **6.4 Conversion of all analogue assignments in the Appendices 30 and 30A Regions 1 and 3 Plan and List to digital assignments**

In accordance with Resolution 556 (WRC-15), as from 1 January 2017 all analogue assignments included in Article 9A of Appendix 30A and Article 11 of Appendix 30 and in the Regions 1 and 3 Lists shall be converted to digital assignments.

In accordance with *resolves* 1.2 of Resolution 556 (WRC-15), the reference situation (EPM) of the Regions 1 and 3 Plans and Lists and of other submissions under Article 4 of Appendices 30 and 30A which are still at the stage of application of that Article, as contained in the SPS\_ALL database, will be updated accordingly.

The SPS\_ALL database contained in BR IFIC 2836 of 10 January 2017 will incorporate the above-mentioned changes and updated reference situation.

### **6.5 Comments on Special Sections published under § 4.1.5 of Appendices 30 and 30A**

WRC-15 adopted modifications to the procedure for submitting comments applicable to Regions 1 and 3 in §4.1.10 of Appendices 30 and 30A. In accordance with the revised provisions, an administration that has not notified its agreement within a period of four months following the date of publication of a Special Section as referred to in §4.1.5 of Appendices 30 and 30A shall be deemed to have not agreed to the proposed assignment.

Any comments from administrations on Special Sections AP30/E or AP30A/E (as well as comments on Special Sections AP30-30A/F/D related to the use of the guardbands in Regions 1 and 3 under Article 2A of Appendices 30 and 30A) which are published as of 1 January 2017 shall be sent to the Bureau and to the notifying administration by telefax.

WRC-15 did not modify the provisions relating to the submission of comments on a modification to the Region 2 Plan or comments on an assignment under Article 2A in support of an assignment subject to the Region 2 Plan. The current approach whereby SpaceCom is used for submitting comments within the four-month period following the publication will continue without change.

## **7 Technical Examinations**

The Bureau makes use of the MSPACE and GIBC software applications to perform the various technical examinations under Articles 2A, 4 and 5 of Appendices 30 and 30A. The tables in Attachment 1 show the coordination requirements required to perform the various technical examinations. Table 1 is for Appendix 30, Tables 2 & 3 are for Appendix 30A.

### **7.1 Examination of Article 2A Networks**

The GIBC software application is used to perform the various technical examinations on Article 2A space operation functions (SOF) networks. The *PF*D (*terrestrial*) component performs the examination of affected territories from the downlink under § 4.1.1 d) / 4.2.3 d) of Article 4 of Appendix 30. The *PF*D (*Space*) component performs the examination of affected space stations under § 3 and 6 of Annex 1 to Appendix 30 and Annex 4 to Appendix 30. The *Appendix 8* component performs  $\Delta T/T$  calculations under § 2 of Annex 4 to Appendix 30A and coordination arc calculations under No. 9.7.

### **7.2 Examination of Article 4 Networks**

In determining those administrations that may be affected, the intra-service compatibility of an incoming Article 4 network is examined using the MSPACE software application with respect to the Region 2 Plan, the Regions 1 and 3 Plan, and the Regions 1 and 3 List as they exist at the date of receipt of the incoming Article 4 network, including other proposed Article 4 networks received on or before that date (whether the procedure of Article 4 is complete or not). The examination consists of ensuring that the limits of Annex 1 of Appendices 30 and 30A are not exceeded.

An incoming Article 4 network is also examined with respect to its compatibility with same-service assignments in other ITU Regions and with other services (terrestrial and non-Planned space services) that share the same frequency bands. The GIBC software application is used for these examinations.

### **7.2.1 Examination of Incoming Article 4 Networks with the Same Date of Receipt**

In accordance with paragraph 3.1 of the Rules of Procedure concerning the Receivability of Forms of Notice, when more than one submission is received on the same date, all those submissions shall be mutually taken into account. Thus when performing a technical examination, the mutual interference affects between those submissions received on the same date are taken into account by applying a special methodology in order to comply with the requirements of the Rule of Procedure.

Due to the different nature of treating “Additions” and “Victims” by the MSPACE software, it is necessary to perform:

- a) an initial MSPACE run to establish the reference situation for all incoming networks as “Victims”; and
- b) a second run for each incoming network as an “Addition” in order to properly assess the interference into other Victim/Plan/List assignments.

### **7.2.2 Examination of an Incoming Article 4 Network Grouped with Plan or List Assignments**

Application of the grouping concept in Regions 1 and 3 is explained in Resolution **548 (Rev.WRC-12)** and in Articles **11** and **9A** of Appendices **30** and **30A** respectively. Based on this concept, when calculating interference to assignments that are part of a group, only the interference contributions from assignments that are not part of the same group are included. Moreover, in accordance with resolves 5 of that Resolution and the Rule of Procedure relating to § 4.1.1 a) and 4.1.1 b) of Appendices **30** and **30A**, for the identification of affected administrations, each network in a group is examined separately without taking into account the other networks in the group.

Thus when performing a technical examination using the MSPACE software, a special methodology is applied in order to comply with Resolution **548 (Rev.WRC-12)** and the Rule of Procedure.

Firstly, the Plan and/or List assignments grouped with the incoming Article 4 network are removed from the database. The reference situation of all remaining assignments is re-calculated creating a “virtual” reference situation. The incoming Article 4 network is then examined against all assignments with this “virtual” reference situation in order to correctly identify affected administrations. The normal reference situation is then restored.

### **7.2.3 Examination of Article 4 Networks at the Stage of Part B**

In order to overcome unresolved disagreements and to fulfil coordination requirements to complete the coordination process, the “Part A” network characteristics are sometimes modified at the stage of submitting the “Part B” request under § 4.1.12 of Article 4 of Appendices **30** and **30A**. 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 § 4.1.11/4.2.15 of Article 4 of Appendices **30** and **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.

WRC-07 and WRC-15 modified § 4.1.11 to further clarify the situation when modified “Part A” characteristics are submitted to the Bureau. Additional examinations are necessary in order to ensure that the following assignments are not considered as being affected and don’t receive more interference as a result of the modifications than that produced by the initial Part A characteristics:

- assignments of any other administration received by the Bureau in accordance with § 4.1.3 or § 4.2.6, or § 2A.1.4 of Article **2A**, or § 7.1 of Article **7**, or No. **9.7** before the modified proposal is received under § 4.1.12;
- assignments of any other administration contained in the Plans or the Lists; or
- terrestrial services of any other administration.

In addition, WRC-15 confirmed the practice of the Bureau to accept agreements with administrations identified under § 4.1.11.

### **7.3 Examination of Article 5 Networks**

For a Plan or List assignment to be entered in the Master Register, the notified technical characteristics have to be the same as those in the Plans or Lists except those allowed in provision 5.2.1 d) of Article **5** of Appendices **30** and **30A** and its associated Rules of Procedure. Those characteristics shall not increase the interference potential to, nor claim more protection from, other assignments in the Plans or Lists or of other services.

In the case where modified characteristics have been submitted, a calculation is undertaken by the Bureau to determine if the proposed new characteristics would increase the interference level caused to other assignments in the appropriate Regional Plan, in the Regions 1 and 3 List, in the same service or in another service sharing the same frequency bands. The procedure is detailed in the Rule of Procedure relating to provision 5.2.1 d) of Appendices **30** and **30A**.

WRC-15 aligned the procedures for “bringing into use” and “suspension/resumption of use” with those of Article **11** and Appendix **30B**.

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**Attachment 1**

**Table 1**  
**Inter/intra-regional and inter/intra-service sharing coordination requirements**  
**between SOF, planned BSS, and other services at 12 GHz**

“Existing” Service ↓ Require protection from “incoming” service →	SOF R1&3 11700-11714 MHz	SOF R2 12200-12212 MHz	SOF R1 12489-12500 MHz	SOF R3 12189-12200 MHz	SOF R2 12688-12700 MHz	BSS R1**** Plan/List/Art.4 11700-12500 MHz	BSS R3**** Plan/List/Art.4 11700-12200 MHz	BSS R2**** Plan/Art.4 12200-12700 MHz	Other Space Services	Terrestrial Service
<b>SOF R1&amp;3 11700-11714 MHz</b>	No. 9.7* (AP8)					4.1.1 e) (PXT)	4.1.1 e) (PXT)		No. 9.7* (AP8)	No.9.18*** (AP7)
<b>SOF R2 12200-12212 MHz</b>		No. 9.7* (AP8)				4.1.1 e) (PXT)		4.2.3 e) (PXT)	No. 9.7* (AP8)	No.9.18*** (AP7)
<b>SOF R1 12489-12500 MHz</b>			No. 9.7* (AP8)			4.1.1 e) (PXT)		4.2.3 e) (PXT)	No. 9.7* (AP8)	No.9.18*** (AP7)
<b>SOF R3 12189-12200 MHz</b>				No. 9.7* (AP8)		4.1.1 e) (PXT)	4.1.1 e) (PXT)		No. 9.7* (AP8)	No.9.18*** (AP7)
<b>SOF R2 12688-12700 MHz</b>					No. 9.7* (AP8)			4.2.3 e) (PXT)	No. 9.7* (AP8) & No. 9.17A***	No.9.18*** (AP7)
<b>BSS R1**** Plan/List/Art.4 11700-12500 MHz</b>	Article 7 (PXT)**	Article 7 (PXT)**	Article 7 (PXT)**	Article 7 (PXT)**		4.1.1 a) & b) (MSPACE)	4.1.1 a) & b) (MSPACE)	4.2.3 a) & b) (PXT)	AP30 Art.6 & 7	No.9.19 AP30 Article 6, An.3
<b>BSS R3**** Plan/List/Art.4 11700-12200 MHz</b>	Article 7 (PXT)**			Article 7 (PXT)**		4.1.1 a) & b) (MSPACE)	4.1.1 a) & b) (MSPACE)	4.2.3 a) & b) (PXT)	AP30 Art.6 & 7	No.9.19 AP30 Article 6, An.3
<b>BSS R2**** Plan/Art.4 12200-12700 MHz</b>		Article 7 (PXT)**	Article 7 (PXT)**		Article 7 (PXT)**	4.1.1 c) (PXT)	4.1.1 c) (PXT)	4.2.3 c) (MSPACE)	AP30 Art.6 & 7	No.9.19 AP30 Article 6, An.3
<b>Other Space Services</b>	No. 9.7* (AP8)	No. 9.7* (AP8)	No. 9.7* (AP8)	No. 9.7* (AP8)	No. 9.7* (AP8)	4.1.1e) (PXT)	4.1.1e) (PXT)	4.2.3 e), 4.2.3 f) (PXT) (AP8*****)	Articles 9, 11 & 22	No.9.18 (AP7)
<b>Terrestrial Services</b>	4.1.1d) (PFD) & No. 9.17***	4.2.3d) (PFD) & No. 9.17***	4.1.1d) (PFD) & No. 9.17***	4.1.1d) (PFD) & No. 9.17***	4.2.3d) (PFD) & No. 9.17***	4.1.1d) (PFD)	4.1.1d) (PFD)	4.2.3 d) (PFD)	Articles 9, 11 & 21 (PFD)	

\* and the associated provisions of Articles 9 and 11.

\*\* Annex 4 of AP30 criteria to be applied.

\*\*\* This provision is applicable for specific earth stations. Assumes SOF is a “non-BSS” earth station.

\*\*\*\* In the case of an assignment with a non-standard emission where the necessary bandwidth falls within a guardband.

\*\*\*\*\* AP8 is used for examinations under Section 7 of Annex 1 to Appendix 30

**Table 2**  
**Inter/intra-regional and inter/intra-service sharing coordination requirements**  
**between SOF, planned feeder-links for the BSS, and other services at 17 GHz**

<b>“Existing” Service ↓ Require protection from “incoming” service →</b>	<b>SOF R1&amp;3 17300-17314 MHz</b>	<b>SOF R2 17300-17312 MHz</b>	<b>SOF R1&amp;3 18089-18100 MHz</b>	<b>SOF R2 17788-17800 MHz</b>	<b>FSS(BSS) R1&amp;3 Plan/List/Art.4 17300-18100 MHz</b>	<b>FSS(BSS) R2 Plan/Art.4 17300-17800 MHz</b>	<b>Other Space Services</b>
<b>SOF R1&amp;3 17300-17314 MHz</b>	No. 9.7* (AP8)	No. 9.7* (AP8)			4.1.1 d) (AP8)	4.1.1 d) (AP8)	No. 9.7* (AP8)
<b>SOF R2 17300-17312 MHz</b>	No. 9.7* (AP8)	No. 9.7* (AP8)			4.1.1 d) (AP8)	4.1.1 d) (AP8)	No. 9.7* (AP8)
<b>SOF R1&amp;3 18089-18100 MHz</b>			No. 9.7* (AP8)		4.1.1 d) (AP8)		No. 9.7* (AP8)
<b>SOF R2 17788-17800 MHz</b>				No. 9.7* (AP8)	4.1.1 d) (AP8)	4.1.1 d) (AP8)	No. 9.7* (AP8)
<b>FSS(BSS) R1&amp;3 Plan/List/Art.4 17300-18100 MHz</b>	Article 7*** (AP8)	Article 7*** (AP8)	Article 7*** (AP8)	Article 7*** (AP8)	4.1.1 a) & b) (MSPACE)	4.2.2 a) & b) (AP8)	Art. 7 of AP30A
<b>FSS(BSS) R2 Plan/Art.4 17300-17800 MHz</b>	Article 7*** (AP8)	Article 7*** (AP8)		Article 7*** (AP8)	4.1.1 c) (AP8)	4.2.2 c) (MSPACE)	Art. 7 of AP30A
<b>Other Space Services</b>	No. 9.7* (AP8)	No. 9.7* (AP8)	No. 9.7* (AP8) No. 9.17A**	No. 9.7* (AP8) No. 9.17A**	4.1.1 d) (AP8)		Articles 9 & 11
<b>Terrestrial Services</b>			No. 9.17** (AP7)	No. 9.17** (AP7)			

\* and the associated provisions of Articles 9 and 11.

\*\* This provision is applicable for specific earth stations.

\*\*\* Section 2 of Annex 4 of AP30A criteria to be applied.

**Table 3**  
**Inter/intra-regional and inter/intra-service sharing coordination requirements between SOF, planned feeder-links for the BSS, and other services at 14 GHz**

<b>“Existing” Service ↓ Require protection from “incoming” service →</b>	<b>SOF R1&amp;3 14500-14511.8 MHz</b>	<b>SOF R1&amp;3 14788.14-14800 MHz</b>	<b>FSS(BSS) R1&amp;3 Plan/List/Art.4 14500-14800 MHz</b>	<b>Other**** Space Services</b>
<b>SOF R1&amp;3 14500-14511.8 MHz</b>	No. 9.7* (AP8)		4.1.1 d) (AP8)	No. 9.7* (AP8)
<b>SOF R1&amp;3 14788.14-14800 MHz</b>		No. 9.7* (AP8)	4.1.1 d) (AP8)	No. 9.7* (AP8)
<b>FSS(BSS) R1&amp;3 Plan/List/Art.4 14500-14800 MHz</b>	Article 7*** (AP8)	Article 7*** (AP8)	4.1.1 a) & b) (MSPACE)	Art. 7 of AP30A
<b>Other**** Space Services</b>	No. 9.7* (AP8)	No. 9.7* (AP8)	4.1.1 d) (AP8)	Articles 9 & 11
<b>Terrestrial Services</b>	No. 9.17** (AP7)	No. 9.17** (AP7)		

\* and the associated provisions of Articles 9 and 11.

\*\* This provision is applicable for specific earth stations.

\*\*\* Section 2 of Annex 4 of AP30A criteria to be applied.

\*\*\*\* This sharing situation may occur with non-planned Region 2 feeder-links.