# Fixed-Satellite Service Plan (AP30B)

## RADIOCOMMUNICATION BUREAU

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ITU-BR Space Regulatory workshop, Geneva, 7 to 11 July 2008

# OUTLINE

I. History

II. Element of FSS Plan

III. Plan / List

IV. Main Regulatory Aspects

V. Processing of Article 6/7 Submissions

VI. Compatibility Criteria

VII. Main changes at WRC-07

# APPENDIX 30B of RR - FSS PLAN

I. Adopted by WARC ORB-88 (World Administrative Radio Conference on the Use of the Geostationary-Satellite Orbit and the Planning of Space Services Utilizing It).

II. Modified by WRC-07 (World Radio Conference) to reflect the most recent technology development.

III. Objective:
to guarantee in practice, for all countries, equitable access to the geostationary-satellite orbit in the frequency bands of the fixed-satellite service covered by Appendix 30B.

# ELEMENT OF ALLOTMENT (1)

I. Nominal orbital position

II. Bandwidth of 800MHz (uplink and downlink)

III. Service area for national coverage

# Nominal orbital position

One orbital position for each country

except for those countries which have large territories to be covered from a single orbital position



# FREQUENCY BANDS (1)

**Plan and List frequency bands are identified in :**

- ✓ Article 5 (Allocation Table & Footnotes) of the RR
- ✓ Footnote of Article 11 of the RR
- ✓ Article 3 of Appendix 30B

# FREQUENCY BANDS (2)

## 6 / 4 GHz
(300 MHz)

6725 - 7025 MHz (up)

4500 - 4800 MHz (down)

## 13 / 10-11 GHz
(500 MHz)

12.75 - 13.25 GHz (up)

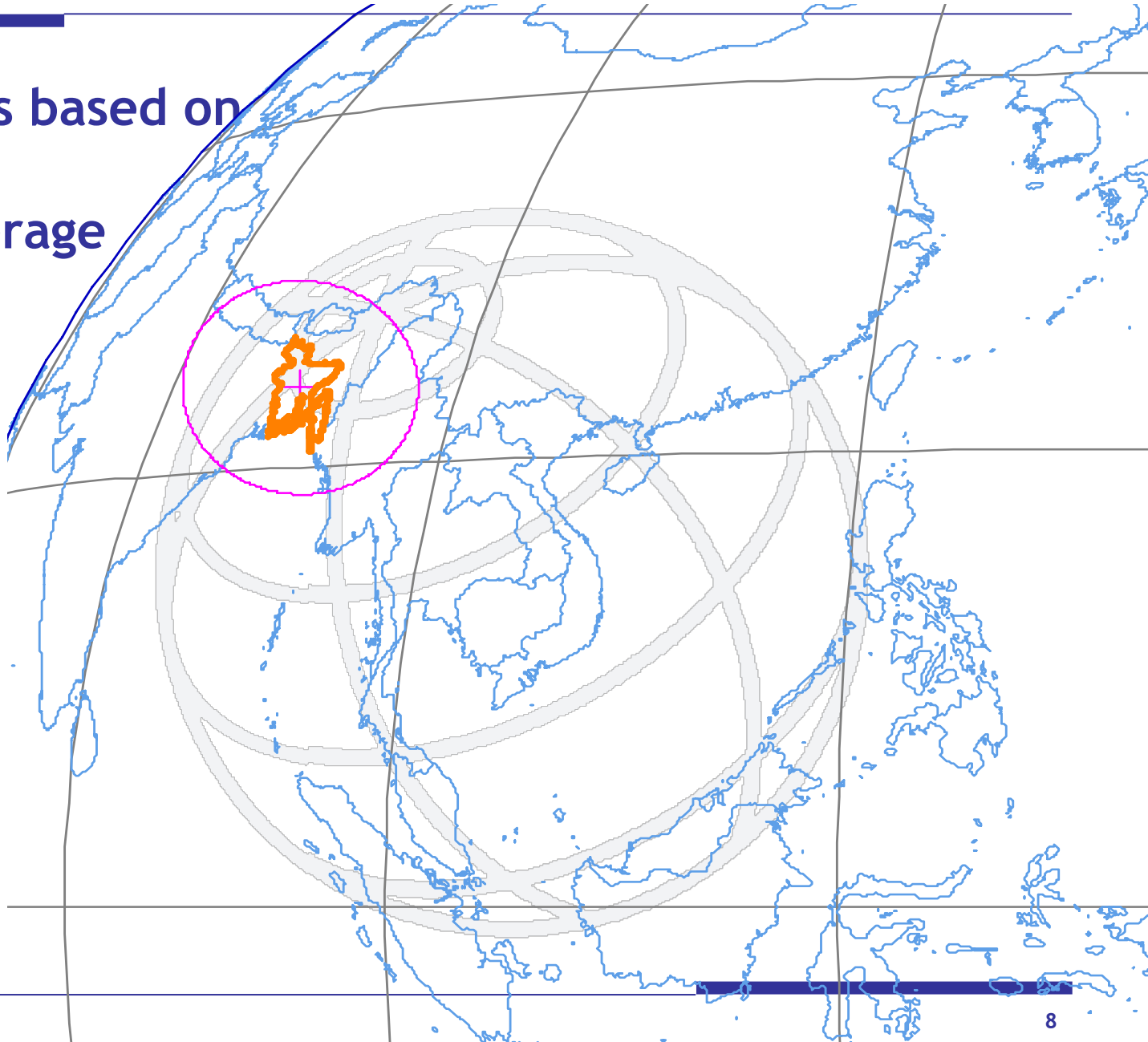
10.70 - 10.95 GHz (down)

11.20 - 11.45 GHz (down)

# Service area

Service area is based on

national coverage



# ELEMENT OF ALLOTMENT (3)

**National allotments are included in:**

**Article 10 of AP30B (the Plan)**

- **orbital position, power levels and ellipse parameters …**

  More details like the test points associated to each beam are included in the SPS database of AP30B http://www.itu.int/itu-r/space/plans/AP30B

# Entries in the AP30B Plan

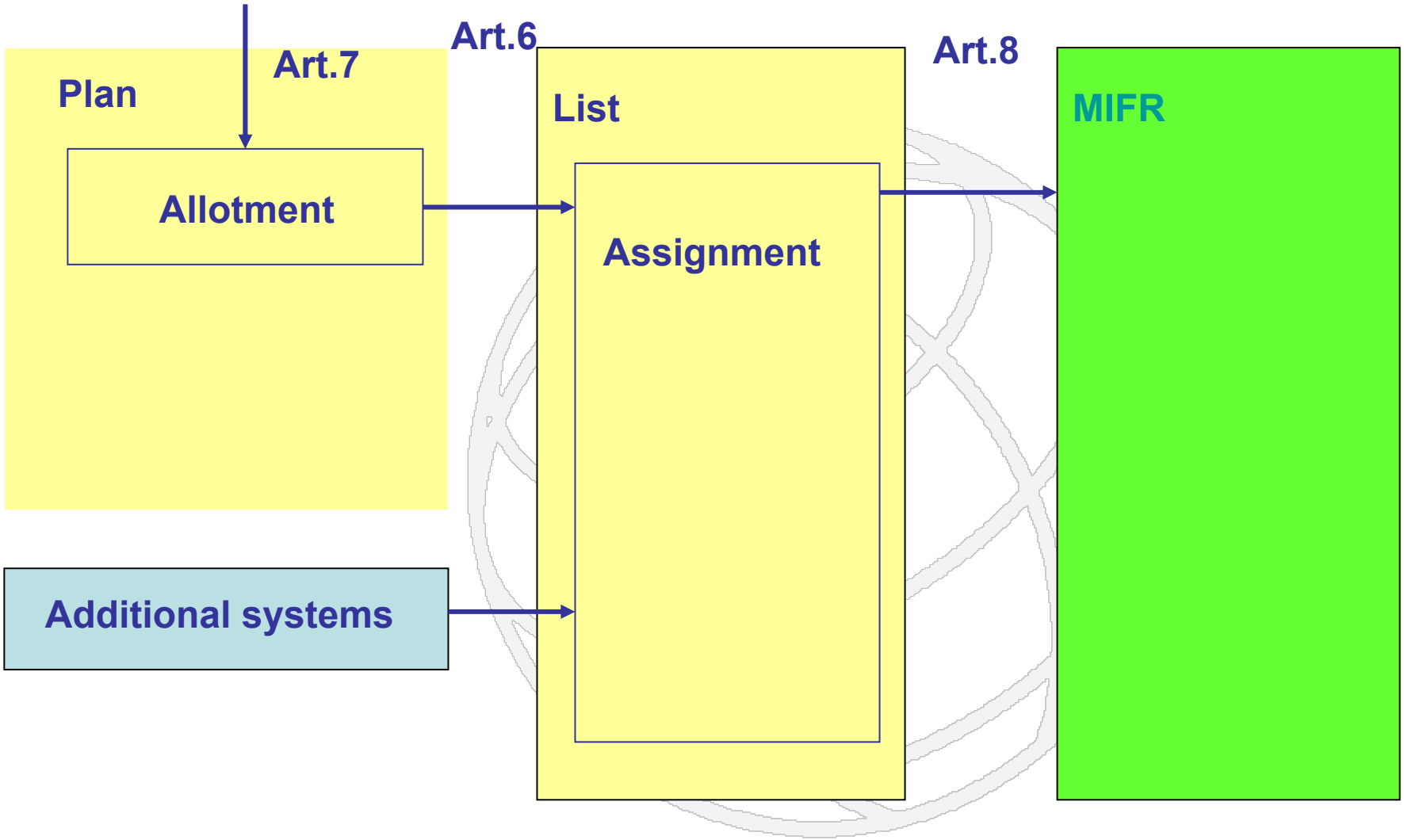
In 4/6GHz band:

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|
| BGD | 133.0 | 90.20 | 24.00 | 1.60 | 1.60 | 90.00 | -9.6 | -40.3 | |

In 13/10-11GH band:

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|
| BGD | 133.0 | 90.20 | 24.00 | 0.8 | 0.8 | 90.00 | -3.9 | -21.9 | |

# PROCEDURES OF AP30B



# ADDITIONAL SYSTEMS

I. A system for which the assignments submitted by an administration are not the result of conversion of an allotment into assignments

II. The national allotment of the administration submitting additional systems shall be retained

# LIST OF ASSIGNMENTS

I. Assignments derived from allotments (Plan)

II. Assignments relating to additional systems

III. Assignments relating to former existing systems in Part B

IV. Assignments relating to former subregional systems

V. Assignments relating to former additional uses

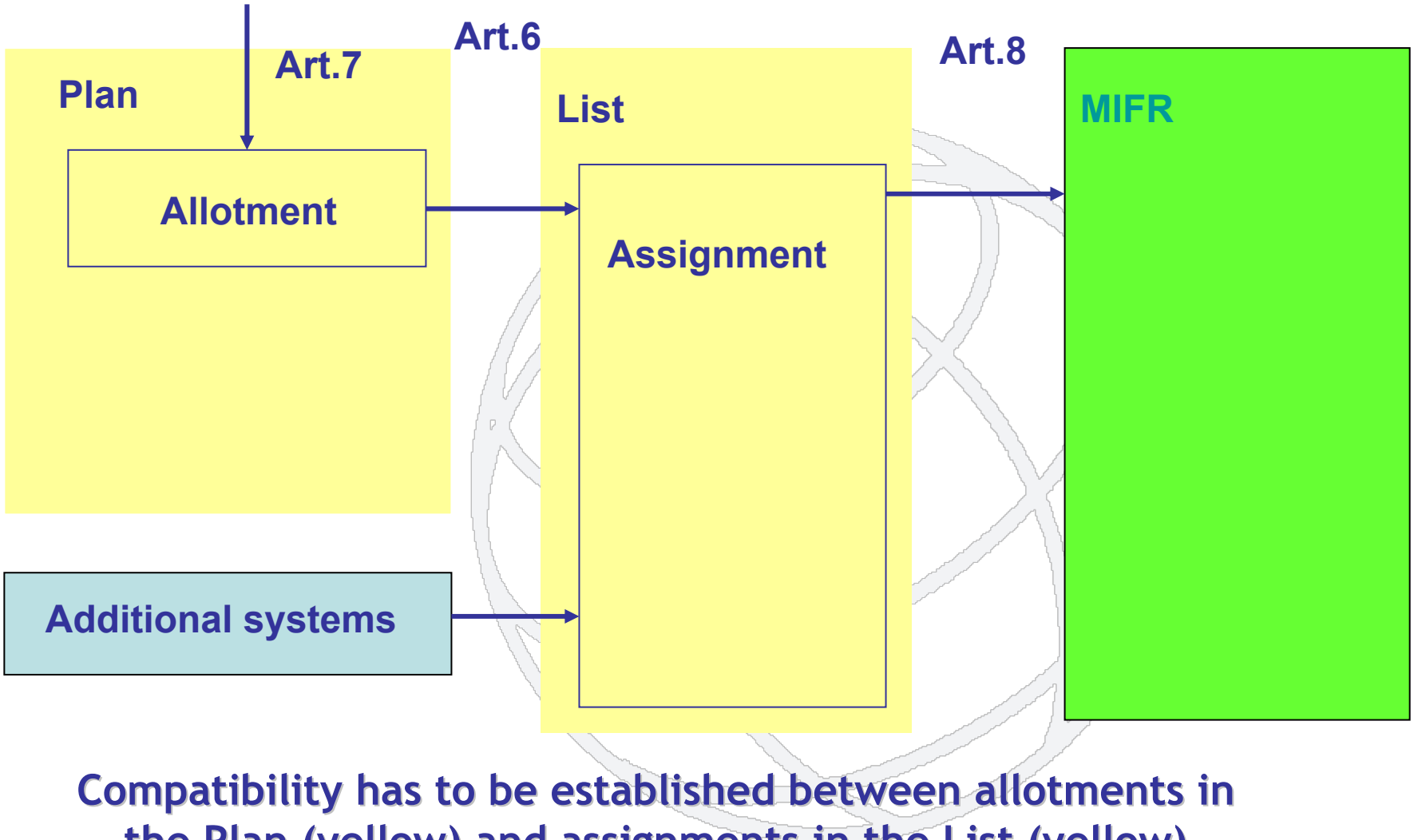
# ELEMENT OF ALLOTMENT (2)

**General basic technical characteristics are described in**

Annex 1 of AP 30B

- Type of modulation (any type), Polarization (any), C/N, Protection ratio, System noise, Antenna, reference bandwidth, pointing accuracy etc.
- Most of them are characteristics used for establishing the Plan at WARC-ORB-88 and subsequently updated by WRC-07
  → can be different for modifications
- However, when "shall" is used in provisions
  → has to be observed

# COMPATIBILITY




Compatibility has to be established between allotments in the Plan (yellow) and assignments in the List (yellow)

# COMPATIBILITY CRITERIA

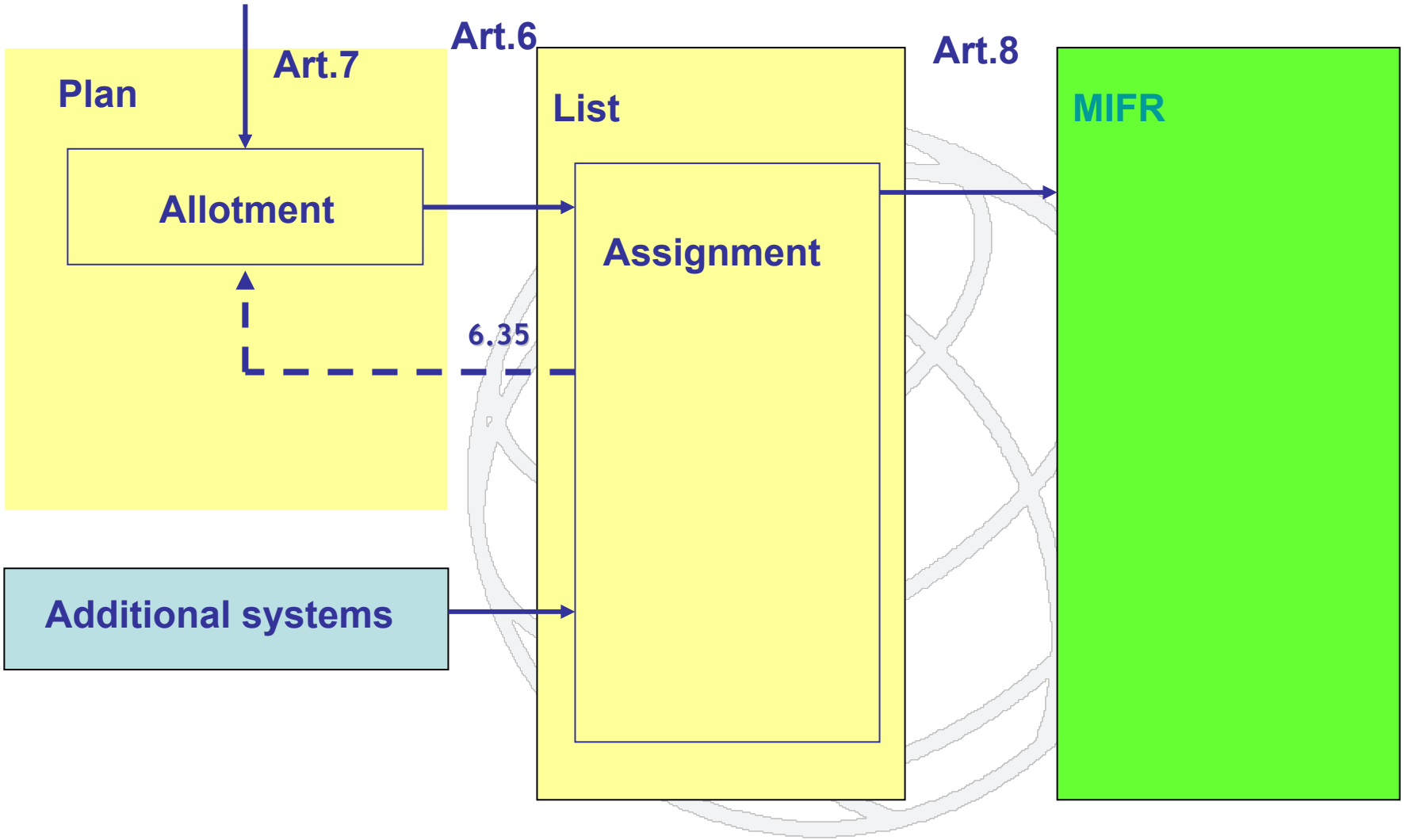
**Compatibility among allotments in the Plan and assignments in the List at WRC-07**

Aggregate C/I ratio of 21 dB

with coordination arc concept

(26 dB at WARC-ORB-88)

# MAIN REGULATORY ASPECTS



# CONVERSION AND AGREEMENT SEEKING

## Article 6 of AP30B

1. **Former Sections I (conversion), IA (conversion with modification), IB (existing system) II (subregional system), III (additional use) were combined into single procedure which is applicable for**
    - I. Conversion of an allotment into an assignment
    - II. Introduction of an additional system
    - III. Modification of an assignment in the List
2. **8 years Regulatory period from receipt of Article 6 submission**
    - I. to complete Article 6 procedure (obtain agreement) to be included in the List
    - II. to bring assignments into use (confirmation through notification procedure)
    - III. to submit due diligence information (Res.**49**)

# NEW ALLOTMENT FOR A NEW MEMBER STATE
## Article 7 of AP30B

I. **A new Member State can obtain a national allotment in the Plan Required information:**

- ✓ Geographical coordinates of 20 test points (max.)
- ✓ Height above sea of each test point
- ✓ Any special requirement, other than a fixed orbital position

II. **The Bureau identifies the proposed orbital locations with associated technical parameters**

III. **Processing the request ahead of pending submissions for Article 6**

IV. **In case of incompatibility the request will be placed ahead of pending submissions Article 6 and Article 6 procedure applies**

# NOTIFICATION OF ASSIGNMENTS

## Article 8 of AP30B

**I.** **Any assignment for which Article 6 procedure has been successfully applied shall be notified in accordance with Article 8 of AP30B**

- Final characteristics for List assignments to be recorded in MIFR (not taken into account in subsequent technical examination)
- Confirmation of date of bringing into use

**II.** **AP4 data should be submitted not earlier than 3 years but not later than 8 years after the submission under Article 6**

**IV.** **Published in Part IS → Part IIS or Part IIIS**

**V.** **All assignment data in MIFR can be found on the BR IFIC & the ITU website at: http://www.itu.int/sns/**

# ARTICLE 8 EXAMINATION

**I. Conformity with the Convention, Table of Allocations, other provisions (Art.21 of RR)**

**II. Conformity with the List**

- ✓ Methodology to check the conformity with the List is in the ROP

# PROCESSING OF ARTICLE 6 SUBMISSIONS (1)

Administration

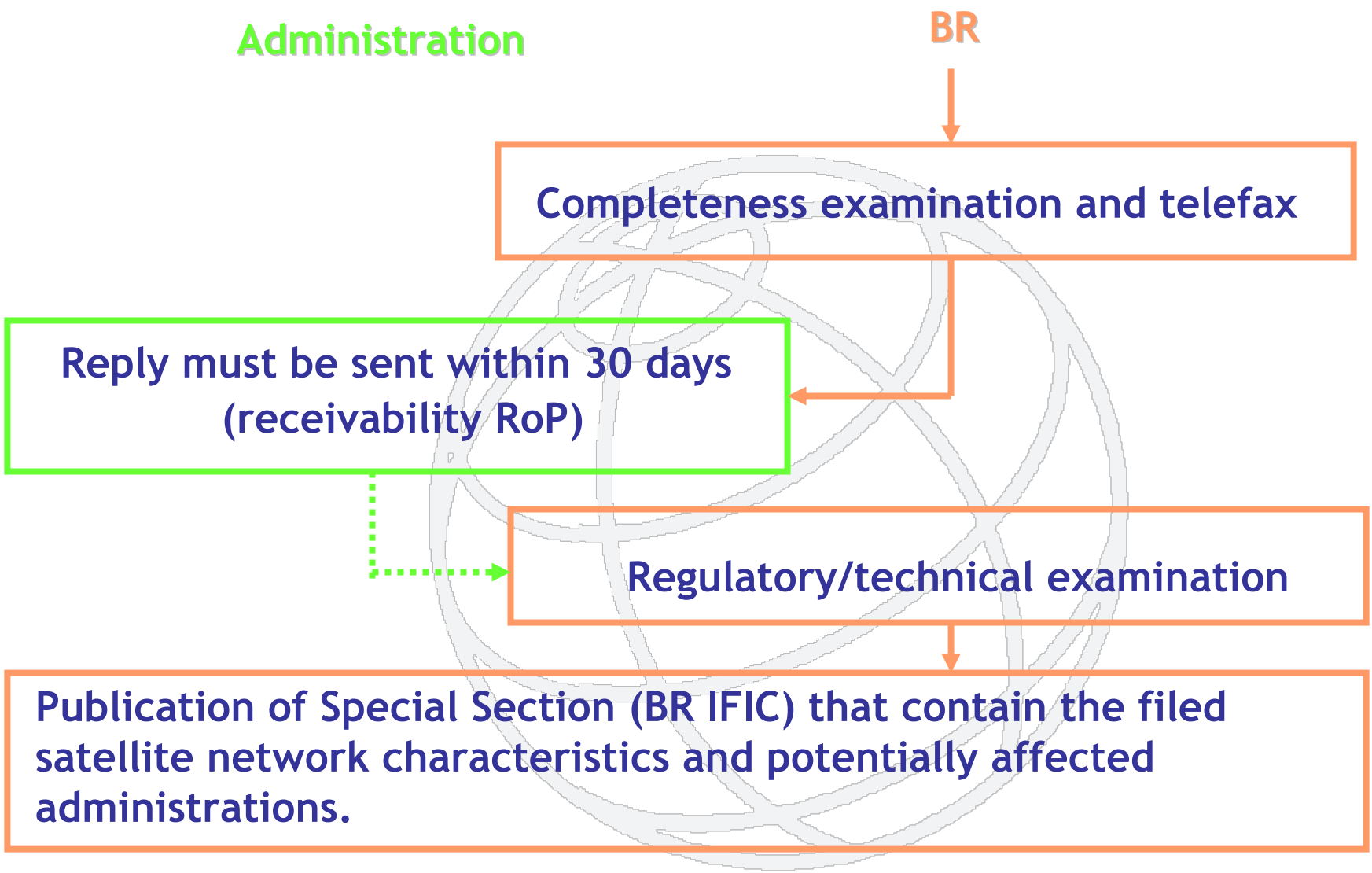
BR

Submission of AP4 data not earlier than 8 years before planned date of brining into use

Acknowledgement by telefax

Publication of the submitted information as received (SNL Part C: http://www.itu.int/ITU-R/space/snl/)

# PROCESSING OF ARTICLE 6 SUBMISSIONS (2)



# PROCESSING OF ARTICLE 6 SUBMISSIONS (3)

Administration

BR

Administrations should examine each BR IFIC to see if their assignments are affected and respond within 4 months

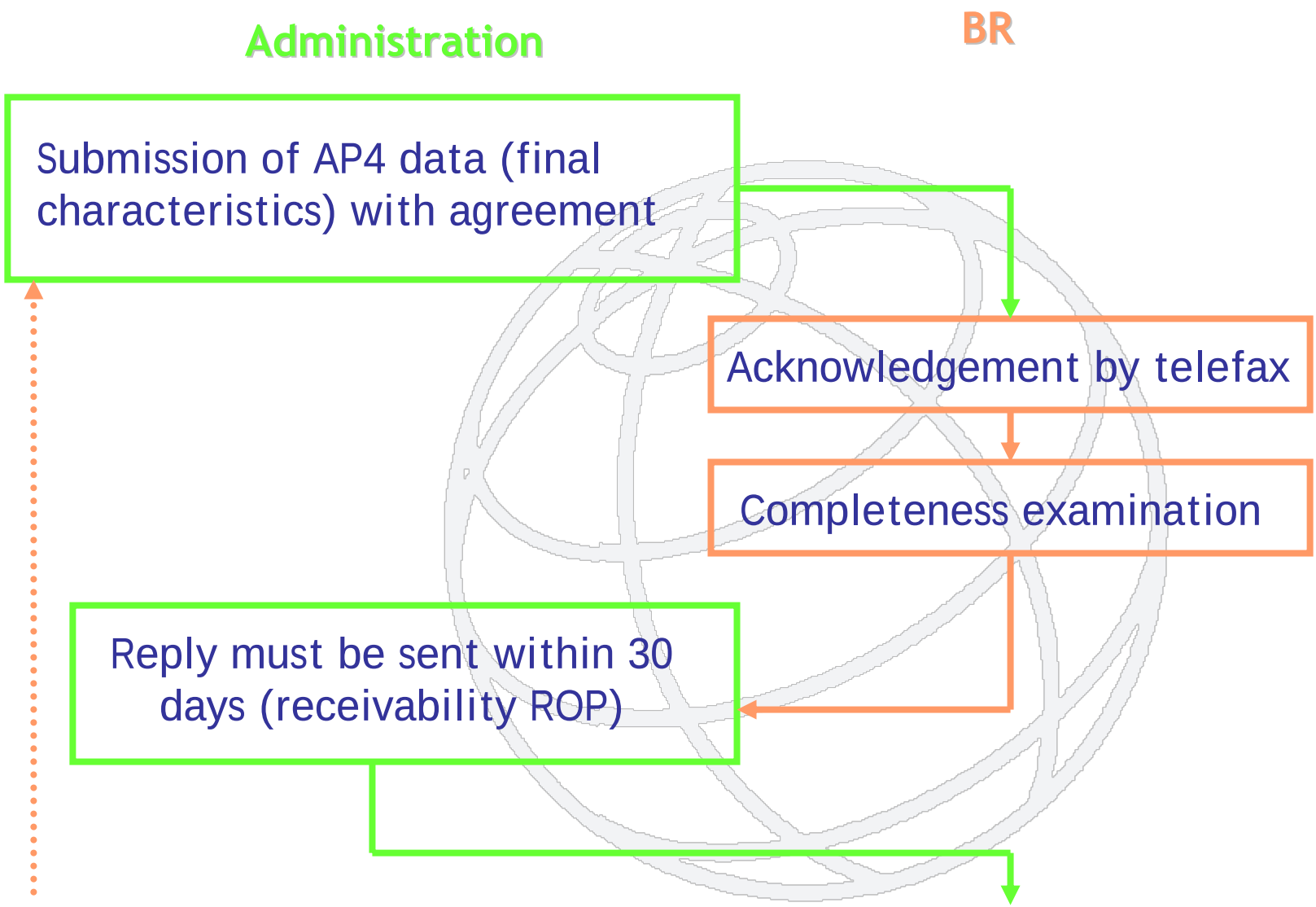
Affected administrations that do not comment within the 4 month period are deemed to have not agreed

Notifying administration can request assistance of the BR to receive replies from affected administrations

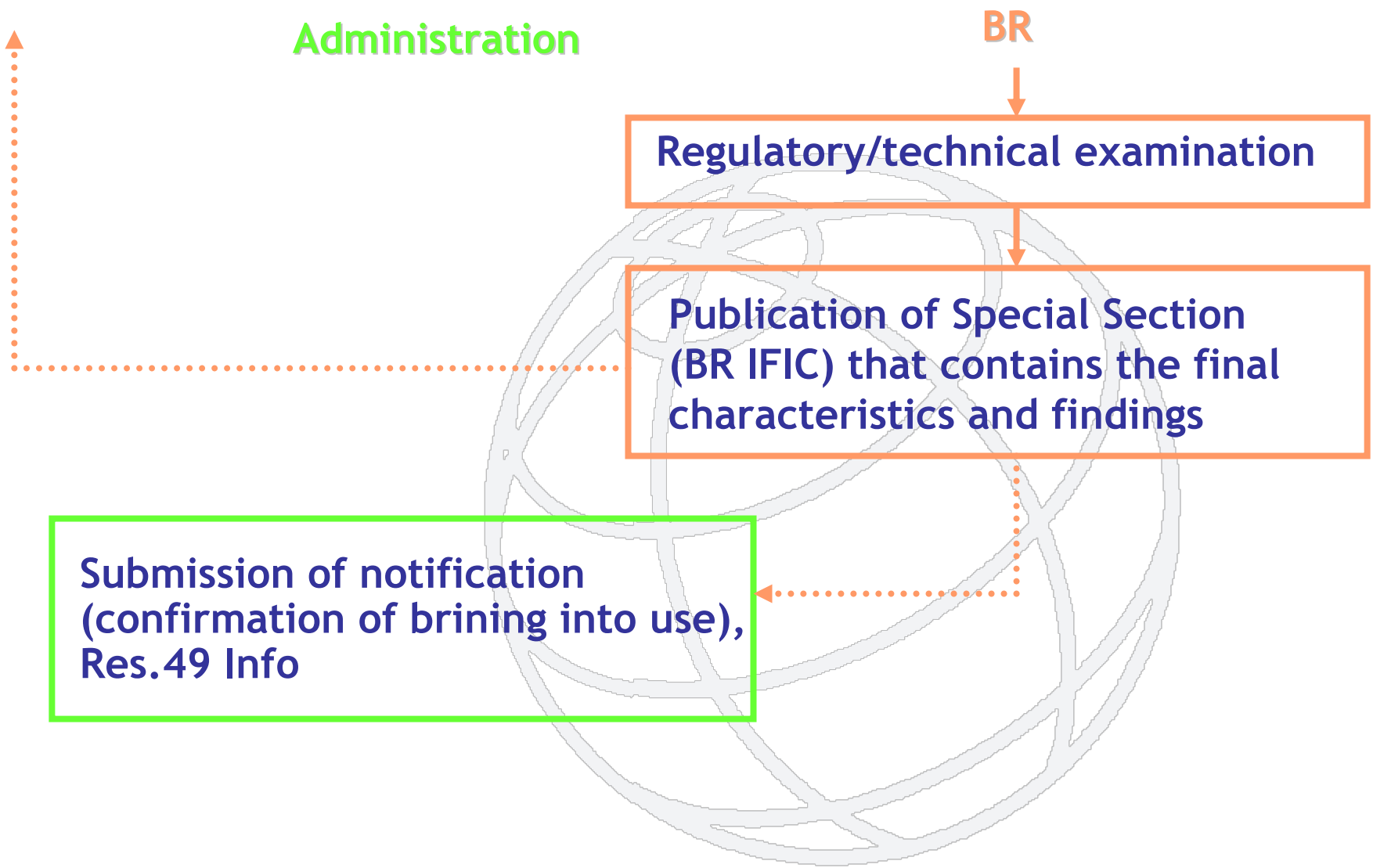
The BR sends a reminder to the affected administration which has not replied

No response to the BR's reminder is considered as agreement

# PROCESSING OF ARTICLE 6 SUBMISSIONS (4)



# PROCESSING OF ARTICLE 6 SUBMISSIONS (5)



# PROCESSING OF ARTICLE 6 SUBMISSIONS (6)

I. The latest reference situation and the characteristics of networks are contained in the SPS database distributed on the BR IFIC and posted on http://www.itu.int/ITU-R/space/plans/AP30B

II. SPS software (calculation of C/I), SpaceCap (capture data), SpacePub (print data) can be used for SPS database. Further development is underway on the SpaceQry software

# COMPATIBILITY CRITERIA (1)

## Compatibility with Plan and List in application of Articles 6 and 7

### I. Annex 3

Compatibility outside coordination arc

- ✓ Downlink PFD hard limit
  on any portion of the surface of the Earth

- ✓ Uplink PFD hard limit
  towards any location in the geostationary-satellite orbit located beyond the coordination arc

# COMPATIBILITY CRITERIA (2)

## II. Annex 4

Compatibility Within the coordination arc,

**agreement** is required when

at least one of the following three conditions is not satisfied

I. **Uplink single-entry C/I ≥ 30dB, or (C/N)up +9dB, or accepted value**

II. **Downlink single-entry C/I ≥ 26.65dB or (C/N)down +11.65dB or accepted value**

III. **Over all aggregate C/I ≥ 21dB or (C/N)total+7dB or accepted value**

- ✓ Computation precision is 0.05dB for all
- ✓ Tolerance of 0.25dB for aggregate C/I criteria of assignments not stemming from conversion (within the envelop characteristics of the initial allotment)

# COMPATIBILITY CRITERIA (3)

I. **Compatibility with terrestrial services in application of Articles 6 and 7**

- ✓ PFD hard limit (Art. 21 of RR)

II. **Compatibility with terrestrial services for earth stations**

- ✓ Coordination contour (Art. 9, 11 of RR & AP7)

# OTHER RELATED ISSUES

I. The updated reference situations after WRC-07 was published (CR278 of 15 February 2008)

II. Implementation of Res.148 (WRC-07) and revised AP30B was explained (CR280 of 4 March)

III. Treatment of Article 7 submissions received before WRC-07 starts…

IV. The new software for application of revised Annexes 3 and 4 to AP30B will be available not later than 17 November 2008

V. As soon as the new software is available, treatment of pending Article 6 submissions will start together with Article 7 submissions received after WRC-07

# USEFUL WEBSITE ADDRESSES FOR MORE INFORMATION

I. http://www.itu.int/ITU-R/space/plans/index.html

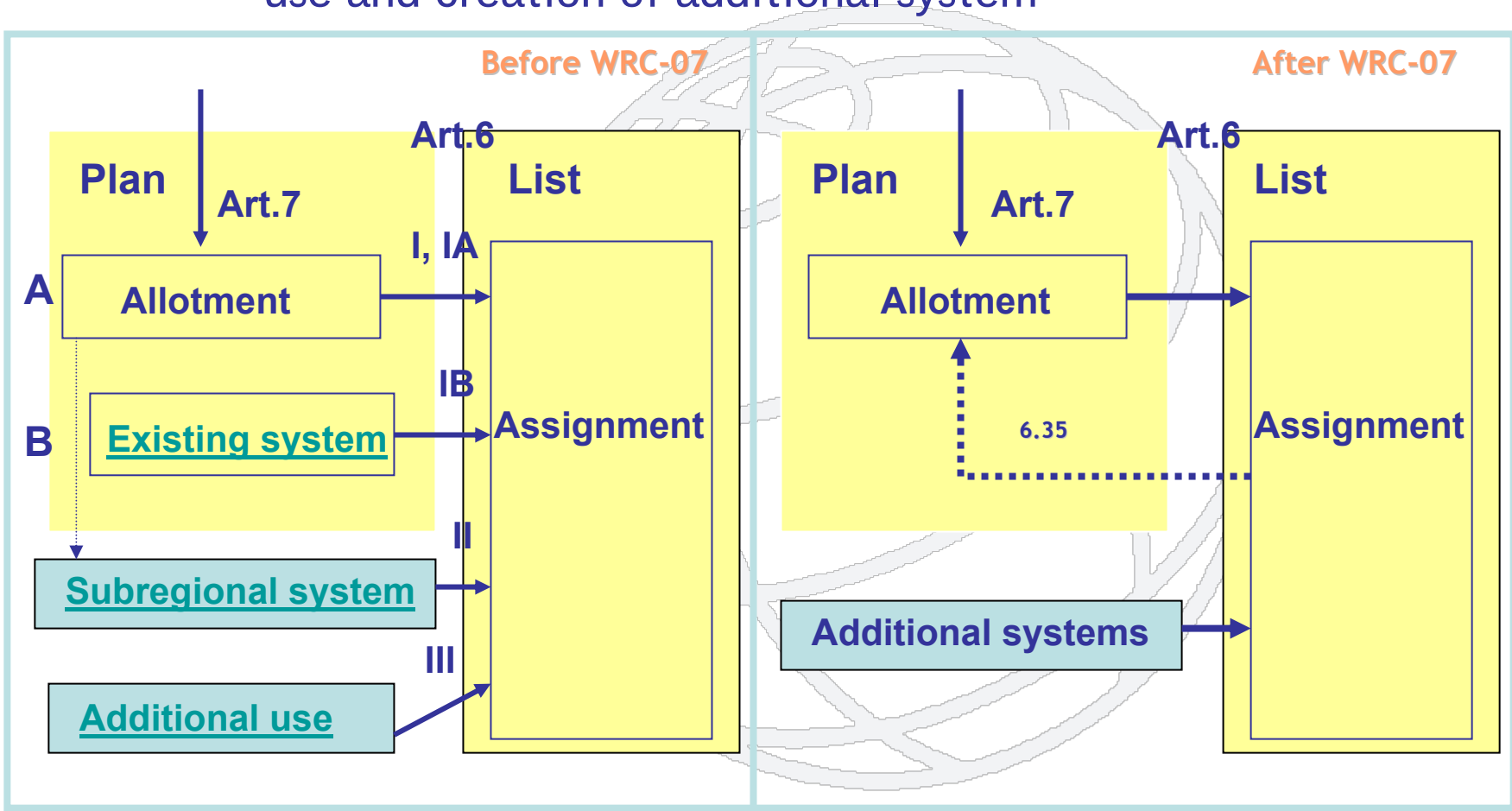
General information relating to space plan services

II. http://www.itu.int/ITU-R/space/snl/index.html

SNL On-Line; list of published networks, networks in the backlog

# CHANGES AT WRC-07 (Procedure)

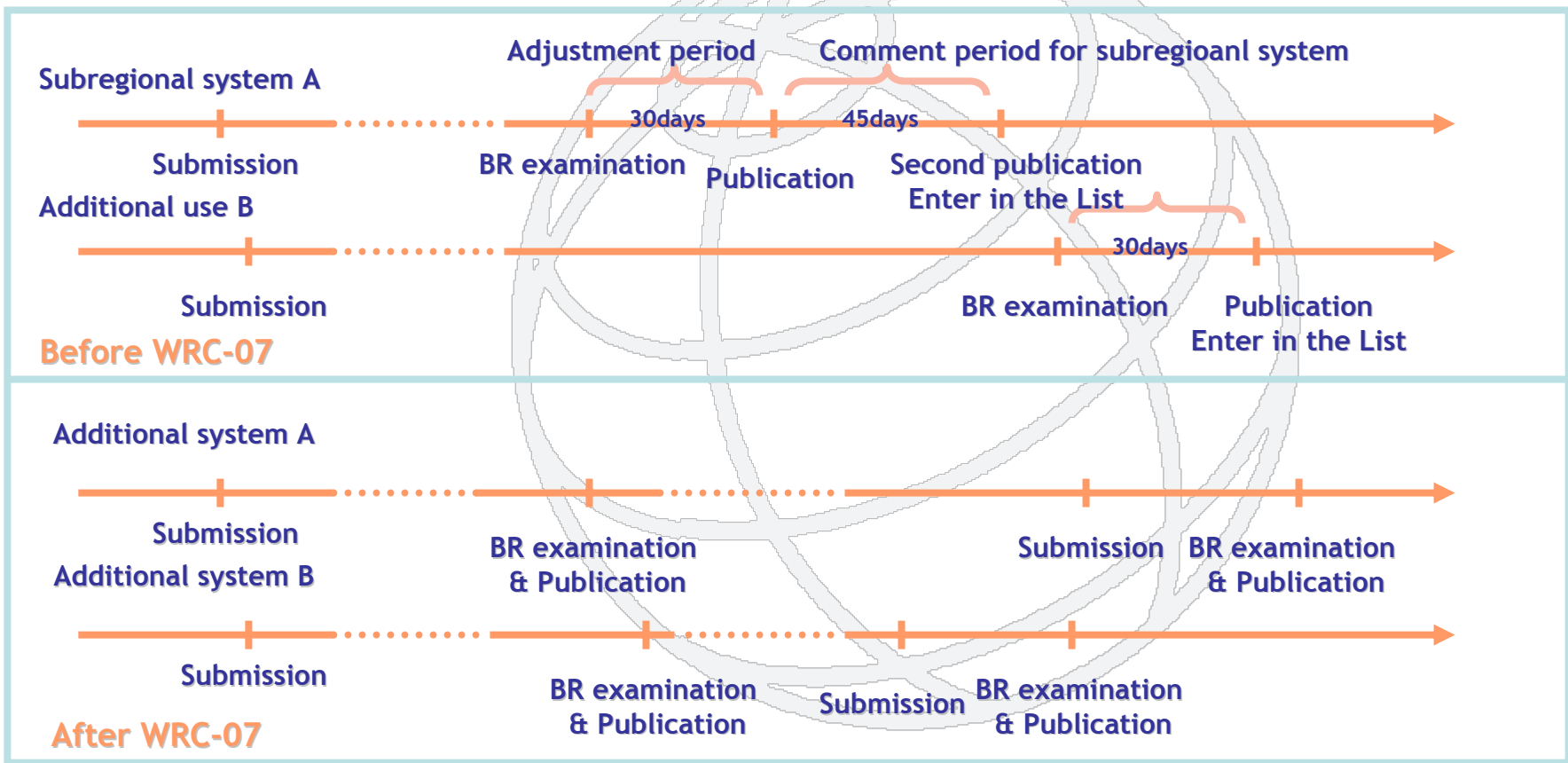
Deletion of existing system, subregional system and additional use and creation of additional system



# CHANGES AT WRC-07 (Procedure)

Two-step approach like AP30/30A (non-sequential treatment)

with deletion of PDA (predetermined arc)



# CHANGES AT WRC-07 (Procedure)

I. Requirement of explicit agreement in case of degradation below limit has been maintained but procedure of BR assistance in case of no response has been introduced (6.10 - 6.15)

II. The provisions to allow provisional entries has been introduced in case of no agreement with respect to assignments (not allotments) (6.24-6.29)

III. Requirement of administrative agreement for inclusion of the territory of other countries in the service area has been maintained but is requested at the end of agreement seeking process (6.19)
The provision to allow exclusion of its territory from the service area at any time has been introduced (6.16)

IV. The provisions to allow processing of Article 7 request ahead of pending submissions for Article 6 have been introduced (7.3-7.7)

V. 0.05 computational precision has been maintained but 0.25 tolerance has been introduced for aggregate C/I of assignments not stemming from the conversion of an allotment into assignment without modification (Annex 4)

VI. The protection based on downlink service area using interpolation has been introduced (Annex 4)

# CHANGES AT WRC-07 (Technical)

I. Coordination Arc Concept has been introduced (±10 degree 6/4GHz, ±9 degrees 13/10-11GHz)

II. Reduced C/N objective (faded) was used (23→21dB feeder link, 17→15dB downlink)

III. Reduced size of antenna was used (7→5.5m 6/4GHz, 3→2.7m 13/10-11GHz)

IV. Reduced system noise temperature was used (earth station 140→95K 4GHz 200→125K 10-11GHz, space station 1000→500K 6GHz 1500→550K 13GHz)

V. Reduced aggregate overall C/I criteria was used (23→21dB)

VI. Deletion of general parameter

VII. Deletion of macro segmentation

# Any questions?



# PREDETERMINED ARC (PDA)

I. The PDA is a segment of the GSO about a nominal orbital position, associated to each satellite system

II. The width of the PDA is reduced as the stage of development of the system progresses.

III. An administration is not considered as affected if its nominal orbital position is moved within the corresponding PDA while keeping interference within the accepted levels

IV. In other words, nominal orbital position can be moved by other administrations

- ✓ Sequential treatment of the submissions

# GENERALIZED PARAMETERS (1)

## I. A & C

- ✓ Up & Down link interference-producing capability expressed by the respective off-axis e.i.r.p. density

## II. B & D

- ✓ Up & Down link interference sensitivity expressed by the respective off-axis receiver sensitivity to interfering e.i.r.p. density

# Macro segmentation

II. The macro segmentation concept* was introduced as a means to avoid coordination during the implementation of an allotment

III. When the macro segmentation scheme is not observed, the allotment can be implemented if compatibility with other systems is achieved

- ✓ * The upper 60% of each allotment band should be used for high-density carriers and the lower 40% for low-density carriers. The high density carriers are those whose ratio of power spectral density peak (4 kHz) to average (necessary bandwidth) is greater than 5 dB. The low density carriers are those for which this ratio is less than 5 dB.
- ✓ * Applicable also sub-regional systems and additional uses (RoP)

# EXISTING SYSTEM

I. Recorded in the MIFR before the adoption of the Plan, or Coordination procedure has been initiated before the adoption of the Plan, or Advance publication information was received by the BR before 8 August 1985

II. Included in Article 10 of AP30B (Part B of the Plan)

III. Existing systems in Part B expire after 20 years from the entry into force of the Appendix 30B (16 March 1990) and have been either entered in the List, as well as notified and brought into use, or have been cancelled

IV. PDA concept can be used

# SUBREGIONAL SYSTEM

I. Satellite system created by agreement among neighbouring countries

II. Intended to provide domestic or subregional services within the geographical areas of the countries concerned

III. All or part of the national allotments used by the subregional system shall be suspended for the life period of the subregional system unless it does not affect allotments or assignments

III. PDA concept can be used

# ADDITIONAL USE

I. Allowed in case of a requirement whose characteristics differ from those used in Part A of the Plan

II. Such requirement can be met only if:

- ✓ the administration has already converted all or part of its allotment into an assignment, or
- ✓ the requirement cannot be met by the conversion of the allotment into an assignment

III. The procedures for additional uses may be applied provided that the proposed assignments have a maximum period of validity of 15 years

IV. Limited to national coverage unless otherwise agreed

V. PDA concept cannot be used

# Article 5 Table of Frequency Allocations

| Region 1 | Region 2 | Region 3 |
|---|---|---|
| 4 500-4 800 | FIXED<br>FIXED-SATELLITE (space-to-Earth) 5.441<br>MOBILE | |
| 6 700-7 075 | FIXED<br>FIXED-SATELLITE (Earth-to-space) (space-to-Earth) 5.441<br>MOBILE<br>5.458 5.458A 5.458B 5.458C | |
| 10.7-11.7<br>FIXED<br>FIXED-SATELLITE<br>(space-to-Earth) 5.441<br>5.484A<br>(Earth-to-space) 5.484<br>MOBILE except aeronautical mobile | 10.7-11.7<br>FIXED<br>FIXED-SATELLITE<br>(space-to-Earth) 5.441<br>5.484A<br>MOBILE except aeronautical mobile | 10.7-11.7<br>FIXED<br>FIXED-SATELLITE<br>(space-to-Earth) 5.441<br>5.484A<br>MOBILE except aeronautical mobile |
| 12.75-13.25 | FIXED<br>FIXED-SATELLITE (Earth-to-space) 5.441<br>MOBILE<br>Space research (deep space) (space-to-Earth) | |

return

**5.441** The use of the bands 4 500-4 800 MHz (space-to-Earth), 6 725-7 025 MHz (Earth-to-space) by the fixed-satellite service shall be in accordance with the provisions of Appendix **30B**. The use of the bands 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) by geostationary-satellite systems in the fixed-satellite service shall be in accordance with the provisions of Appendix **30B**. The use of the bands 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) by a non-geostationary-satellite system in the fixed-satellite service is subject to application of the provisions of No. **9.12** for coordination with other non-geostationary-satellite systems in the fixed-satellite service. Non-geostationary-satellite systems in the fixed-satellite service shall not claim protection from geostationary-satellite networks in the fixed-satellite service operating in accordance with the Radio Regulations, irrespective of the dates of receipt by the Bureau of the complete coordination or notification information, as appropriate, for the non-geostationary-satellite systems in the fixed-satellite service and of the complete coordination or notification information, as appropriate, for the geostationary-satellite networks, and No. **5.43A** does not apply. Non-geostationary-satellite systems in the fixed-satellite service in the above bands shall be operated in such a way that any unacceptable interference that may occur during their operation shall be rapidly eliminated. (WRC-2000)

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ARTICLE 3

**Frequency bands**

3.1 The provisions of this Appendix shall apply to the fixed-satellite service in the frequency bands between:

– 4 500 and 4 800 MHz (space-to-Earth);

– 6 725 and 7 025 MHz (Earth-to-space);

– 10.70 and 10.95 GHz (space-to-Earth);

– 11.20 and 11.45 GHz (space-to-Earth);

– 12.75 and 13.25 GHz (Earth-to-space).

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**4 500-4 800 MHz, 6 725-7 025 MHz**

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|
| ABW00000 | -98.20 | -69.10 | 12.40 | 1.60 | 1.60 | 90.00 | -9.6 | -41.4 | |
| ADL00000 | 113.00 | 140.00 | -66.70 | 1.60 | 1.60 | 90.00 | -9.6 | -41.3 | */MB1 |
| AFG00000 | 50.00 | 66.40 | 33.90 | 2.20 | 1.60 | 15.00 | -9.6 | -39.4 | |
| AFS00000 | 71.00 | 27.20 | -30.10 | 5.30 | 1.60 | 128.00 | -7.8 | -38.6 | |
| AGL00000 | -36.10 | 15.90 | -12.40 | 2.40 | 1.60 | 78.00 | -9.6 | -39.1 | |
| ALB00000 | 4.13 | 20.00 | 41.10 | 1.60 | 1.60 | 90.00 | -9.6 | -41.4 | |
| ALG00000 | -33.50 | 1.60 | 27.80 | 3.30 | 2.20 | 133.00 | -8.6 | -38.9 | |
| ALS00000 | -159.00 | -158.60 | 57.50 | 6.30 | 1.60 | 1.00 | -7.9 | -38.8 | */MB2 |
| AND00000 | -41.00 | 1.50 | 42.50 | 1.60 | 1.60 | 90.00 | -9.6 | -41.4 | |
| ARG00000 | -51.00 | -62.00 | -33.60 | 4.80 | 2.90 | 93.00 | -2.5 | -38.1 | */MB3 |
| ARGINSUL | -51.00 | -60.00 | -57.50 | 3.60 | 1.60 | 154.00 | -9.6 | -38.5 | */MB3 |
| ARM00000 | 71.40 | 45.13 | 40.12 | 1.60 | 1.60 | 90.00 | -9.6 | -40.4 | |
| ARS00000 | 51.90 | 45.70 | 23.10 | 3.70 | 2.60 | 153.00 | -8.7 | -39.3 | |
| ASCSTHTC | -37.10 | -11.80 | -19.60 | 5.60 | 1.80 | 77.00 | -8.0 | -39.0 | */MB4 |
| ATG00000 | -77.70 | -61.80 | 17.00 | 1.60 | 1.60 | 90.00 | -9.6 | -41.8 | |

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