Document WRC-19-IRWSP-18/15-E
Part 2
21 November 2018
English only

ITUEvents

2nd ITU Inter-regional Workshop on WRC-19 Preparation

20–22 November 2018
Geneva, Switzerland

www.itu.int/go/ITU-R/wrc-19-irwsp-18

Organized by:

2nd ITU INTER-REGIONAL WORKSHOP ON WRC-19 PREPARATION (Geneva, 20-22 November 2018)

Satellite services

Part II

WRC-19 agenda items

Agenda items 1.4, 1.5, 1.6, 7, 9.1 (issues 9.1.3, 9.1.9)

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CHAPTER 3 OVERVIEW
PART II

1.4 to consider the results of studies in accordance with Resolution **557 (WRC-15)**, and review, and revise if necessary, the limitations mentioned in Annex **7** to Appendix **30 (Rev. WRC 15)**, while ensuring the protection of, and without imposing additional constraints on, assignments in the Plan and the List and the future development of the BSS within the Plan, and existing and planned FSS networks

1.5 to consider the use of the frequency bands 17.7-19.7 GHz (s-to-E) and 27.5 29.5 GHz (E-to-s) by earth stations in motion communicating with GSO space stations in the FSS and take appropriate action, in accordance with Resolution **158 (WRC-15)**

1.6 to consider the development of a regulatory framework for non-GSO FSS satellite systems that may operate in the frequency bands 37.5-39.5 GHz (s-to-E), 39.5-42.5 GHz (s-to-E), 47.2-50.2 GHz (E-to-s) and 50.4-51.4 GHz (E-to-s), in accordance with Resolution **159 (WRC-15)**

CHAPTER 3 OVERVIEW
PART II

7 to consider possible changes, and other options, in response to Resolution **86 (Rev. Marrakesh, 2002)** of the Plenipotentiary Conference, an advance publication, coordination, notification and recording procedures for frequency assignments pertaining to satellite networks, in accordance with Resolution **86 (Rev.WRC-07)**, in order to facilitate rational, efficient and economical use of radio frequencies and any associated orbits, including the geostationary-satellite orbit

AI 9 to consider and approve the Report of the Director of the Radiocommunication Bureau, in accordance with Article 7 of the Convention:

9.1 on the activities of the Radiocommunication Sector since WRC-15

Issue 9.1.3: Resolution **157 (WRC-15)**

Study of technical and operational issues and regulatory provisions for new non-geostationary-satellite orbit systems in the 3 700-4 200 MHz, 4 500-4 800 MHz, 5 925-6 425 MHz and 6 725 7 025 MHz frequency bands allocated to the FSS

Issue 9.1.9: Resolution **162 (WRC-15)**

Studies relating to spectrum needs and possible allocation of the frequency band 51.4-52.4 GHz to the FSS (Earth-to-space)

AI 1.4

1.4 to consider the results of studies in accordance with Resolution **557 (WRC-15)**, and review, and revise if necessary, the limitations mentioned in Annex **7** to Appendix **30 (Rev. WRC 15)**, while ensuring the protection of, and without imposing additional constraints on, assignments in the Plan and the List and the future development of the BSS within the Plan, and existing and planned FSS networks

Resolution **557 (WRC-15)** – *Consideration of possible revision of Annex 7 to Appendix **30** of the Radio Regulations*

AI 1.4
Annex 7 to RR Appendix 30 (Rev.WRC-15) limitations

Annex 7 limitation	Region and service of interfering assign.	Region and service of impacted assignments	Frequency band, GHz	Limitation description
A1a	Region 1 BSS	Region 2 FSS (Atlantic)	11.7-12.2	No assignments in the Region 1 List further west than 37.2° W
A1b		Region 2 FSS (Pacific) Region 3 BSS subject to RR Appendix 30		No assignments in the Region 1 List further east than 146° E
A2a	Region 2 BSS	Region 1 FSS (Atlantic)	12.5-12.7	No modification in the Region 2 Plan further east than 54° W
A2b		Region 1 BSS subject to RR Appendix 30	12.2-12.5	No modification in the Region 2 Plan further east than 44° W
A2c		Region 3 FSS Region 1 BSS subject to RR Appendix 30 Region 1 FSS (Pacific)	12.2-12.7 12.2-12.5 12.5-12.7	No modification in the Region 2 Plan further west than 175.2° W
A3a	Region 1 BSS	Region 2 FSS	11.7-12.2	No assignments in the Regions 1 and 3 List outside specific allowable portions of the orbital arc between 37.2° W and 10° E
A3b				Maximum e.i.r.p. of 56 dBW for assignments in the Regions 1 and 3 List at specific allowable portions of the orbital arc between 37.2° W and 10° E
A3c				Maximum power flux-density of −138 dB(W/(m^2 · 27 MHz)) at any point in Region 2 by assignments in the Regions 1 and 3 List located at 4° W and 9° E
B	Region 2 BSS	Region 2 BSS subject to RR Appendix 30	12.2-12.7	Required agreement of administrations having assignments to space stations in the same cluster when an administration may locate a satellite within this cluster

Methods to satisfy AI 1.4

Method A: NOC, SUP Resolution **557 (WRC-15).**

Method B: Deletion of some limitations of Annex 7 and addition of draft new Resolutions [A14-LIMITA3] (WRC-19), [B14-PRIORITY] (WRC-19)

SUP: – limitations "**A1a**", "**A2a**", "**A2b**", "**A3b**", and "**A3c**";

– limitation "**A3a**" accompanied by draft new Resolution **[A14-LIMITA3] (WRC-19)** to guarantee the protection of frequency assignments with earth station receiving antenna size smaller than 60 cm (40 cm and 45 cm), in accordance with the criteria of RR Appendix **30 (Rev.WRC-15)**.

NOC: limitations "**A1b**", "**A2c**" and "**B**".

ADD: Draft new Resolution **[B14-PRIORITY] (WRC-19)** giving priority to national assignments in the Regions 1 and 3 Plan with equivalent downlink protection margin values equal or below −10 dB.

SUP: Resolution **557 (WRC-15)**.

Methods to satisfy AI 1.4 (cont.)

Method C: Deletion of some limitations of Annex 7, addition of draft new Resolutions [A14-LIMITA3] (WRC-19), [B14-PRIORITY] (WRC-19) and application of draft new Resolution [C14-LIMITA1A2] (WRC-19) with revised criteria for protection of future BSS networks with respect to limitations "A1a" and "A2a"

SUP:
- limitations "**A1a**" and "**A2a**" and the application of draft new Resolution **[C14-LIMIT-A1A2] (WRC-19)** with revised criteria for protection of future BSS networks;
- limitations "**A2b**", "**A3b**", "**A3c**";
- limitations "**A3a**" accompanied by draft new Resolution **[A14-LIMITA3] (WRC-19)** to guarantee the protection of frequency assignments with earth station receiving antenna size smaller than 60 cm (40 cm and 45 cm), in accordance with the criteria of RR Appendix **30 (Rev.WRC-15)**.

NOC: limitations "**A1b**", "**A2c**" and "**B**".

ADD: Draft new Resolution **[B14-PRIORITY] (WRC-19)** after the removal of the relevant limitations in Annex 7 to RR Appendix **30 (Rev.WRC-15)**, giving priority to national assignments in the Regions 1 and 3 Plan with equivalent downlink protection margin values equal or below −10 dB.

SUP Resolution **557 (WRC-15)**.

AI 1.5

1.5 to consider the use of the frequency bands 17.7-19.7 GHz (space-to-Earth) and 27.5-29.5 GHz (Earth-to-space) by earth stations in motion communicating with geostationary space stations in the fixed-satellite service and take appropriate action, in accordance with Resolution **158 (WRC-15)**

Resolution **158 (WRC-15)** – *Use of the frequency bands 17.7-19.7 GHz (space-to-Earth) and 27.5-29.5 GHz (Earth-to-space) by earth stations in motion communicating with geostationary space stations in the fixed-satellite service*

AI 1.5
Background

ESIM are earth stations that communicate with GSO FSS space stations but operate on platforms in motion in the frequency bands 17.7-19.7 GHz and 27.5-29.5 GHz. Currently there are three types of ESIM:

- ESIM on aircraft (aeronautical ESIM);
- ESIM on ships (maritime ESIM), and
- ESIM on land vehicles (land ESIM).

Any of the three types of ESIM can be used to provide broadband communications, including Internet connectivity.

Methods to satisfy AI 1.5

Method A: NOC, SUP Resolution **158 (WRC-15).**

Method B:

ADD: RR 5.A15 The operation of earth stations in motion communicating with geostationary FSS space stations in the frequency bands 17.7-19.7 GHz and 27.5-29.5 GHz shall be subject to draft new Resolution **[A15] (WRC-19)**. (WRC-19)

ADD: Draft new Resolution **[A15] (WRC-19)** "Use of the frequency bands 17.7-19.7 GHz and 27.5-29.5 GHz by earth stations in motion (ESIM) communicating with geostationary space stations in the fixed-satellite service".

MOD: Table **A** of the Annex **2** to RR Appendix **4** "General characteristics of the satellite network, earth station or radio astronomy station".

SUP: Resolution **557 (WRC-15)**.

AI 1.6

1.6 to consider the development of a regulatory framework for non-GSO FSS satellite systems that may operate in the frequency bands 37.5-39.5 GHz (space-to-Earth), 39.5-42.5 GHz (space-to-Earth), 47.2-50.2 GHz (Earth-to-space) and 50.4-51.4 GHz (Earth-to-space), in accordance with Resolution **159 (WRC-15)**

Resolution **159 (WRC-15)** – *Studies of technical, operational issues and regulatory provisions for non-geostationary fixed-satellite services satellite systems in the frequency bands 37.5-39.5 GHz (space-to-Earth), 39.5-42.5 GHz (space-to-Earth), 47.2-50.2 GHz (Earth-to-space) and 50.4-51.4 GHz (Earth-to-space)*

AI 1.6
Background

Advances in satellite design, manufacturing and launch service capabilities have enabled the deployment of non-GSO FSS constellations. Additionally, the advances in antenna and terminal technology have enabled the development of the 50/40 GHz frequency bands for both GSO FSS/BSS and non-GSO FSS.

There are currently no regulatory provisions for sharing between non-GSO systems and GSO networks in the 50/40 GHz frequency bands. Moreover, there are no existing mechanisms in the RR establishing coordination procedures applicable to non-GSO systems operating within the FSS allocations in frequency bands in the 37.5 to 51.4 GHz range, such as the application of RR No. **9.12**. This also contributes to uncertainty among potential operators of non-GSO satellite systems in these bands.

To address these issues, WRC-15 established agenda item 1.6 for WRC-19

Methods to satisfy AI 1.6

Method A:

ADD: RR No. **5.A16** to subject the frequency bands 37.5-39.5 GHz (↓), 39.5-42.5 GHz (↓), 47.2-50.2 GHz (↑) and 50.4-51.4 GHz (↑) to the provisions of RR No. **9.12** to address the coordination between non-GSO FSS systems.

MOD: RR Article **22** to include:

- a single-entry permissible time allowance for degradation in terms of *C/N* of GSO FSS networks in the 50/40 GHz frequency bands, in order to protect GSO FSS networks from non-GSO FSS systems operating in the subject frequency ranges;
- aggregate time allowance for degradation in terms of *C/N* of GSO FSS networks in order to protect GSO FSS networks from non-GSO FSS systems operating in the subject frequency ranges, and **develop a new WRC Resolution** providing the procedure to ensure that aggregate limits will not be exceeded.

ADD: RR No. **5.B16** in the frequency band 39.5-40.5 GHz in all Regions to address the coordination between MSS and non-GSO FSS systems under RR No. **9.11A**.

MOD: Modify the unwanted emission limits for the FSS in Resolution **750 (Rev.WRC-15)** to protect EESS (passive) systems operating in the band 50.2-50.4 GHz from harmful interference from non-GSO FSS systems operating in the frequency bands 47.2-50.2 GHz and 50.4-51.4 GHz.

Incorporate GSO reference links into an ITU-R Recommendation, which will be used as the basis for the calculation of single-entry and aggregate limits.

Methods to satisfy AI 1.6

Method B:

ADD: RR No. **5.C16** to subject the frequency bands 37.5-39.5 GHz (↓), 39.5-42.5 GHz (↓), 47.2-50.2 GHz (↑) and 50.4-51.4 GHz (↑) to the provisions of RR No. **9.12** to address the coordination between non-GSO FSS systems.

MOD: RR Article **22** to include:

- a single-entry permissible time allowance for degradation in terms of *C/N* of GSO FSS networks in the 50/40 GHz frequency bands, in order to protect GSO FSS networks from non-GSO FSS systems operating in the subject frequency ranges;
- aggregate time allowance for degradation in terms of *C/N* of GSO FSS networks in order to protect GSO FSS networks from non-GSO FSS systems operating in the subject frequency ranges, and **develop a new WRC Resolution** providing the procedure to ensure that aggregate limits will not be exceeded.

ADD: RR No. **5.D16** in the frequency band 39.5-40.5 GHz in all Regions to address the coordination between MSS and non-GSO FSS systems under RR No. **9.11A**.

MOD: Modify the unwanted emissions limits for the FSS in Resolution **750 (Rev.WRC-15)** to protect EESS (passive) systems operating in the band 50.2-50.4 GHz from harmful interference from non-GSO FSS systems operating in the frequency bands 47.2-50.2 GHz and 50.4-51.4 GHz.

Develop and maintain a list of GSO reference links, which will be used as the basis for the calculation of single-entry and aggregate limits.

Methods to satisfy AI 1.6

Method C:

ADD: RR No. **5.E16** to require coordination among non-GSO FSS systems in the bands 37.5-39.5 GHz (↓), 39.5-42.5 GHz (↓), 47.2-50.2 GHz (↑) and 50.4-51.4 GHz (↑).

MOD: RR Article **22** to include new provisions to limit:

– each non-GSO FSS system to a 3% maximum increase of unavailability as associated with the short-term performance objective for reference GSO links;

– the maximum allowable aggregate 10% increase in unavailability for GSO reference links caused by all operational or soon-to-be operational non-GSO FSS systems;

– each non-GSO FSS system to a 3% reduction in throughput (spectral efficiency) as associated with the long-term performance objective for an adaptive coding and modulation GSO reference links (see RR No. **1.109A** for definition of adaptive system);

– non-GSO FSS systems (operational or soon-to-be operational) to a 10% maximum reduction in throughput (spectral efficiency) as associated with the long-term performance objective for adaptive coding and modulation GSO reference links.

ADD: Resolution providing the procedure to ensure that aggregate limits will not be exceeded.

Incorporate GSO reference links into an ITU-R Recommendation, which will be used as the basis for the calculation of single-entry and aggregate limits.

MOD: Modify the unwanted emission limits for the FSS in Resolution **750** (**Rev.WRC-15)** to protect EESS (passive) systems operating in the band 50.2-50.4 GHz from harmful interference from non-GSO FSS systems operating in the bands 47.2-50.2 GHz and 50.4-51.4 GHz.

Methods to satisfy AI 1.6

Method D:

Method D is identical with Method A with the exception of modifications to Resolution **750 (Rev.WRC-15)**. Some studies considered the impact on EESS (passive) operations from GSO FSS unwanted emissions. These studies have demonstrated that GSO FSS systems have exhausted all of the EESS (passive) interference margin, therefore this method proposes to modify both the GSO and the non-GSO earth station out-of-band emission limits in Resolution **750 (Rev.WRC-15)** to allow the aggregate interference to meet the protection criteria.

However, the appropriateness of modifying the GSO out-of-band emission limits is still under consideration.

AI 7

7 to consider possible changes, and other options, in response to Resolution 86 (Rev. Marrakesh, 2002) of the Plenipotentiary Conference, an advance publication, coordination, notification and recording procedures for frequency assignments pertaining to satellite networks, in accordance with Resolution **86 (Rev.WRC-07)**, in order to facilitate rational, efficient and economical use of radio frequencies and any associated orbits, including the geostationary-satellite orbit

Resolution **86 (Rev.WRC-07)** – *Implementation of Resolution 86 (Rev. Marrakesh, 2002) of the Plenipotentiary Conference*

AI 7 ISSUE A

Issue A: Bringing into use of frequency assignments to all non-GSO systems, and consideration of a milestone-based approach for the deployment of non-GSO systems in specific frequency bands and services

- Bringing into use of frequency assignments to non-GSO systems
- Establishment of a milestone-based approach for alignment of non-GSO system deployment with MIFR entries in specific frequency bands and services

AI 7 ISSUE A

Bringing into use of frequency assignments to non-GSO systems

Options relating to the continuous period for confirming BIU

Options	Descriptions
A	A continuous period of at least 90 days in a notified orbital plane of a satellite with the capability of transmitting or receiving the frequency assignments. Applicable to some non-GSO systems based on RoP on RR No. 11.44 (Ed. of 2017).
B	A continuous period of X (one day to 90 days) of deployment in a notified orbital plane of a satellite with the capability of transmitting or receiving the frequency assignments may be sufficient. The 90-day duration may not be required for the non-GSO administration/operator to determine that a space station with the capability has been deployed in a notified orbital plane.
C	No fixed period. Administration informs the Bureau of BIU once it confirms deployment of a space station with the capability of transmitting/receiving the frequency assignments into one of the notified orbital planes[1].

[1] The studies have shown that for some services, e.g., the RNSS, no fixed period is required. Instead, the administration/operator requires only as long as it takes to confirm the deployment into a notified orbital plane of a satellite with the capability of transmitting or receiving the frequency assignments. This can vary from system to system, but will not require 90 or more continuous days of deployment. For this reason, no fixed continuous period is required for these particular systems.

AI 7 ISSUE A

Options for the Milestone-based approach for alignment of non-GSO system deployment with MIFR entries in specific frequency bands and services

Milestone timing (*1) Number of years after the end of the 7-year regulatory period		Minimum required percentage of satellites to be deployed to meet the milestone (*2)		Deployment Factor	
M1	1	P1	A1 & F1: 10%	DF1	10
	2		B1: 8.33%		12
			C1 & D1: 10%		10
			G1: 30%		3.33
	4		E1: 10%		10
M2	3	P2	A2 & F2: 33%	DF2	3.03
	4		C2: 30%		3.33
			B2: 25%		4
	5		D2: 50%		2
	7		E2: 75%		1.34
	2+A (*3 and *4)		G2: 60%		1.66
M3	5	P3	A3: 75%	DF3	1.34
	6		B3: 75%		1.34
			F3: 100%		1
	7		C3: 90%		1.11
			D3: 100%		1
	8		E3: 100%		1
	2+A+B (*5)		G3: 100%		1

(*1) Initial timing is the date of receipt by the BR of the relevant complete information under RR No. 9.1 or No. 9.1A, as appropriate.
(*2) In this column, (A1, A2, A3) (B1, B2, B3), (C1, C2, C3), (D1, D2, D3), (E1, E2, E3), (F1, F2, F3) and (G1, G2, G3) represents all the combinations of 3 milestones identified in the studies for the implementation of the milestone-based approach. For all options, except option (F1, F2, F3), the date for commencement of the milestone process based on the end of the 7-year regulatory period is 01/01/2021. For Option (D1, D2, D3 & F1, F2, F3) an alternative date of commencement is 23/11/2019. For option (B1, B2, B3), it could be a date between 01/01/2021 to 01/01/2024, and may be considered for other options, as the case may be.
(*3) A & B are variables: 12 months ≤ A, B ≤ 30 months based on the conditions met.
(*4) A = (number of satellites launched / 30% of the total number of satellites in the MIFR) *30. Where the resulting number calculated should be rounded up to the greatest whole number.
(*5) B = (number of satellites launched / 60% of the total number of satellites in the MIFR) *30. Where the resulting number calculated should be rounded up to the greatest whole number.

AI 7 ISSUE A
Frequency bands and services considered for application for the milestone-based approach

Bands (GHz)	Space radiocommunication services	
	Option 1	Option 2
Bands generally agreed for inclusion		
10.7-11.45/11.45-11.7/11.7-12.75/12.75-13.25/13.75-14.5/17.3-17.7/27-27.5/37.5-39.5/47.2-50.2/50.4-51.4	FSS	List all primary satellite services
17.7-19.7	FSS (except non-GSO MSS feeder links)	
19.7-20.2/29.5-30/39.5-40.5	FSS and MSS	
27.5-29.5	FSS (except non-GSO MSS feeder links)	All satellite services
40.5-42.5	FSS and BSS	List all primary satellite services
Bands not generally agreed for inclusion		
1.980-2.010/2.170-2.200/43.5-47	MSS	List all primary satellite services
3.400-4.200/5.091-5.250/5.725-7.075/7.250-7.750/7.900-8.400/20.2-21.2/30-31/42.5-43.5/	FSS	

AI 7 ISSUE B

Issue B: Application of coordination arc in the Ka-band, to determine coordination requirements between the FSS and other satellite services

Method B1: NOC

Method B2: Use of the coordination arc with a value of 8 degrees as coordination criteria, to determine if coordination is required between FSS and MSS systems and between MSS systems in the frequency bands 29.5-30 GHz (Earth-to-space)/19.7-20.2 GHz (space-to-Earth), in all 3 Regions, replacing the existing coordination criteria D*T/T* > 6%.
Administrations can always request application of RR No. **9.41** to include additional satellite networks that would be affected taking into account the Δ*T/T* > 6% criteria.

AI 7 ISSUE C

Issue C: Issues for which consensus was achieved in ITU-R and a single method has been identified

- **Issue C1:** AR**11** and AP**30/30A/30B** discrepancies
- **Issue C2:** Frequency bands submitted under AP**30B** Article **6**
- **Issue C3:** AP**30B** MOD to Article **6** No. **6.10**
- **Issue C4:** AP**30/30A** single AP**4** notice for List and Notification
- **Issue C5:** MOD to No. **11.46** and six month resubmission
- **Issue C6:** AP**30B** single AP**4** notice for List and Notification
- **Issue C7:** AP**30B** temporary agreements

AI 7 ISSUE D

Issue D: Identification of those specific satellite networks and systems with which coordination needs to be effected under RR Nos. 9.12, 9.12A and 9.13

Method D1: NOC

Method D2: Under this method, it is proposed to add the requirements to have:

a) a pre-compiled list of potentially affected satellite networks and/or systems, published for information only, included in the CR/C Special Section for coordination under RR Nos. **9.12**, **9.12A** and **9.13**, by stipulating it in RR No. **9.36.1**;

b) the definitive list of affected satellite networks or systems to be considered when effecting coordination under RR Nos. **9.12**, **9.12A** and **9.13** to be included in the CR/D Special Section by stipulating it in RR No. **9.53A**.

The list of potentially affected satellite networks/systems provided in the CR/C is for information only, and to also avoid a different status compared to the list of affected administrations. Under the current regulatory regime, the definitive list of administrations is provided in the CR/D. Under this method, it is proposed to also include the definitive list of satellite networks/systems in the CR/D.

Method D3: Under this method, it is proposed to add the requirements to have the list of satellite networks or systems potentially affected included in the CR/C Special Section for coordination under RR Nos. **9.12**, **9.12A** and **9.13** for information only, by stipulating it in RR No. **9.36.1**. As opposed to Method D2, no further action will be required from the notifying administrations for the list of satellite networks/systems following the publication of the CR/C.

AI 7 ISSUE E

Issue E: Resolution related to RR Appendix 30B

Single Method to satisfy Issue E

Establish special measures to be applied once with respect to the submission received from an administration having no frequency assignments in the RR Appendix 30B List the details of which are to be contained in a WRC Resolution to facilitate the tasks of those administrations to provide an economically viable satellite service to its national territory as initially considered when the allotment Plan was established in 1988.

AI 7 ISSUE F

Issue F: Measures to facilitate entering new assignments into the RR Appendix 30B List

Method F1

– reduced coordination arc and mechanisms to remove unnecessary coordination requirements inside the coordination arc.

– Bringing the size of the coordination arc in line with that used for the unplanned frequency bands, i.e. 7° for C-band and 6° for Ku-band and consequently align the Annex 3 limits to newly established coordination arcs.

– Introducing pfd masks and levels like in RR Appendices **30** and **30A** as well as in portions of the unplanned frequency bands to remove unnecessary coordination and prevent combinations of technical parameters leading to unrealistic links from hindering introduction of new networks. Proposed values for pfd masks and levels are those developed in preparation for WRC-15, based on a level of protection corresponding to $\Delta T/T$ = 6% for C-band antennas with a diameter between 1.2 and 18 m and Ku-band antennas with a diameter between 45 cm and 11 m).

Method F2 NOC

AI 7 ISSUE G

Issue G: Updating the reference situation for Regions 1 and 3 networks under RR Appendices 30 and 30A when provisionally recorded assignments are converted into definitive recorded assignments

Method G1

The administration with an interfered-with network, depending on the specific situation of its network, will determine whether or not the reference situation shall be updated.

Method G2

Quantification of when § **4.1.18** may be used, requirements for both existing and new network to operate exactly at notified parameters, and a Resolution which involves exchange of measurements and outlines how networks can be recorded under § **4.1.18.**

Method G3 NOC

AI 7 ISSUE H

Issue H: Modifications to RR Appendix 4 items to be provided for non-geostationary satellite systems not subject to the procedures of Section II of RR Article 9

Single Method:

Under this method, it is proposed to extend the requirement to provide the following items in RR Appendix **4** for APIs and notifications for frequency assignments to non-GSO systems in frequency bands not subject to coordination under Section **II** of RR Article **9**:

– Items **A.4.b.5.b** (initial phase angle at a reference time) and **A.4.b.5.c** (argument of the perigee, which can be set to 0 for any circular or equatorial orbits).

– Item **A.4.b.6.g** (longitudes of the ascending node for all orbital planes will be required at the same reference time).

It is also proposed to add the following new items in RR Appendix **4** for APIs and notifications for frequency assignments to non-GSO systems in frequency bands not subject to coordination under Section **II** of RR Article **9**:

– new mandatory item, identifying whether the orbit is sun-synchronous or not;

– new optional item, providing the local time of the ascending node (LTAN) for sun-synchronous orbits.

AI 7 ISSUE I

Issue I: Additional RR Appendix 4 data items to be provided for non-geostationary satellite systems with multiple orbital planes

Single Method:

Under this method, it is proposed to include two new items in RR Appendix **4** for the provision of information relating to the multiple orbital planes and their relationship with respect to the non-GSO system:

– new item **A.4.b.1.a**: indicator of whether all of the orbital planes identified under **A.4.b.1** describe a single configuration where all orbits are operated simultaneously or multiple, mutually exclusive configurations identified at the coordination stage with the expectation to select a single configuration at the notification stage. This new item is required for both APIs and CR/Cs as appropriate, when the filing contains more than one orbital plane;

– new item **A.4.b.1.b**: in case the number of orbital planes identified under **A.4.b.1** describe multiple mutually exclusive configurations, this new item allows for the identification of the orbital planes that are associated with each of the mutually exclusive configurations. This new item is required for both APIs and CR/Cs as appropriate, only if the proposed new item **A.4.b.1.a** is different from 1.

AI 7 ISSUE J

Issue J: Pfd limit in Section 1, Annex 1 of RR Appendix 30

Method J1

It is proposed that Section 1, Annex 1 of RR Appendix **30** needs to be modified in order to allow List assignments to exceed the pfd limit given in Section 1 of Annex 1 to RR Appendix **30** only within the national territory of the notifying administration under the condition that the assignment does not overlap with the Regions 1 and 3 guardbands as defined in § 3.9 of Annex 5 to RR Appendix **30** and also under the condition that, on the border areas and other territory of another country, this pfd limit is not exceeded.

Method J2 NOC

AI 7 ISSUE K

Issue K: Difficulties for Part B examinations under § 4.1.12 or 4.2.16 of RR Appendices 30 and 30A and § 6.21 c) of RR Appendix 30B

Single Method

To address the difficulties encountered by the notifying administration in the Part B examination of its junior network ("Network JR") under RR Appendices **30** and **30A** § 4.1.12 or § 4.2.16 or RR Appendix **30B** § 6.21 *c)*, it is proposed to add one more examination under § 4.1.12 or § 4.2.16 RR Appendices **30** and **30A** and § 6.21 *c)* of RR Appendix **30B** such that should any remaining affected networks whose assignments have been entered in the List or Plan, as appropriate, before the submission under § 4.1.12 or § 4.2.16 of RR Appendices **30** and **30A** or § 6.17 of RR Appendix **30B**, the Bureau shall further examine if the remaining corresponding assignments in the List or Plan are still considered as being affected.

In this way, like the current practice today, if examination under § 4.1.12 or § 4.2.16 of RR Appendices **30** and **30A** or § 6.21 *c)* of RR Appendix **30B** of Part B of a junior network ("Network JR-Part B") in respect of Part A of a senior network ("Network SR-Part A") is favourable, the senior network ("Network SR") is considered as not being affected like today and no further examination will be conducted.

Meanwhile, it addresses the difficulties experienced by the notifying administration and allows its notice submitted under § 4.1.12 or § 4.2.16 of RR Appendices **30** and **30A** or § 6.17 of RR Appendix **30B** (Network JR-Part B) to receive favourable findings in respect of Network SR if Network SR-Part B is considered as not affected in the further examination based on the method of Annex 1 (RR Appendix **30**), Annex 1 (RR Appendix **30A**) or Annex 4 (RR Appendix **30B**). This avoids overprotection of Network SR based on the characteristics which are outdated and no longer valid while ensuring Network SR is adequately protected.

AI 7 ISSUE L

Issue L: Update to RR Appendix 4 data elements required for RR Article 22 epfd verification after revision of Recommendation ITU-R S.1503

Single Method

Modifications to RR Appendix **4** in consequence of the revision of Recommendation ITU-R S.1503.

AI 7 ISSUE M

Issue M: Simplified regulatory regime for non-GSO satellite systems with short-duration missions

Single Method

A new WRC Resolution, together with an associated regulatory regime for non-GSO satellite systems with short-duration missions, is proposed.

AI 9.1 ISSUE 9.1.3

issue 9.1.3: Resolution 157 (WRC-15)

Study of technical and operational issues and regulatory provisions for new non-geostationary-satellite orbit systems in the 3 700-4 200 MHz, 4 500-4 800 MHz, 5 925-6 425 MHz and 6 725-7 025 MHz frequency bands allocated to the fixed-satellite service.

Conclusions

One study indicates that circular orbit non-GSO FSS operations in the 6/4 GHz frequency band could result in large exceedances (up to 40 dB) of the GSO protection criteria and concludes that it would be very difficult to operate a non-GSO circular orbit system for the purposes of a global broadband network in the 6/4 GHz frequency bands. Therefore, there is no need to review the values of the existing limits presented in RR Article **22** (epfd) and RR Article **21** (pfd) for the 3 700-4 200 MHz, 4 500-4 800 MHz, 5 925-6 425 MHz, and 6 725-7 025 MHz frequency bands.

Another study suggested to establish a coordination procedure in the frequency bands 3 700-4 200 MHz and 5 925-6 425 MHz between non-GSO FSS systems under RR No. **9.12**. This study finds that there is no need to review the values of the existing limits presented in RR Article **22** (epfd) and RR Article **21** (pfd) for the 3 700-4 200 MHz, 4 500-4 800 MHz, 5 925-6 425 MHz, and 6 725-7 025 MHz frequency bands.

AI 9.1 ISSUE 9.1.9

issue 9.1.9: Resolution 162 (WRC-15)

Studies relating to spectrum needs and possible allocation of the frequency band 51.4-52.4 GHz to the fixed-satellite service (Earth-to-space)

Example 1: New primary allocation to the FSS in the frequency band 51.4-52.4 GHz (Earth-to-space) in RR limited to FSS gateway links for geostationary orbit use.

MOD RR Article **5** to allocate to the FSS in the frequency band 51.4-52.4 GHz (Earth-to-space) subject to the Resolution **750 (Rev. WRC-19)**.
ADD footnote to RR Article **5** to limit the new allocation to gateways operating in FSS GSO networks with a minimum antenna diameter of 4.5 metres.
MOD RR Article **21** to inclusion of the frequency band proposed for the new allocation to FSS (Earth-to-space) for applicability of the limits in RR Nos. **21.2, 21.3, 21.5** and **21.8.**
MOD Table **7C** of the Appendix **7** to RR to include parameters required for the determination of coordination distance for a transmitting earth station in the frequency band 51.4-52.4 GHz (Earth-to-space).
MOD Resolution **750 (Rev. WRC-15)** to limit the unwanted emissions from the FSS Earth stations falling in the frequency band 52.6-54.25 GHz to protect the EESS (passive) according to their elevation angle.

Example 2: NOC

THANK YOU!

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