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PROPOSALS FOR THE WORK OF THE CONFERENCE

Agenda item 9.1(9.1.2)

9.1(9.1.2) Resolution **756 (WRC-12)** – Studies on possible reduction of the coordination arc and technical criteria used in application of No. **9.41** in respect of coordination under No. **9.7**

Background Information: The ITU-R has sought improved ways to accommodate new satellite networks and facilitate more efficient use of the spectrum resources while at the same time ensuring adequate protection of networks operating in accordance with the Radio Regulations. WRC-12 agreed to reduce the coordination arc in the 6/4, 14/10/11/12 and 21.4-22 GHz frequency bands, but did not come to a decision regarding the 30/20 GHz frequency bands. To continue studies, WRC-12 adopted Resolution **756 (WRC-12)**, which *resolves to invite ITU-R:*

1 to carry out studies to examine the effectiveness and appropriateness of the current criterion ($\Delta T/T > 6\%$) used in the application of No. 9.41 and consider any other possible alternatives (including the alternatives outlined in Annexes 1 and 2 to this Resolution), as appropriate, for the bands referred to in recognizing e);

2 to study whether additional reductions in the coordination arcs in RR Appendix 5 (Rev. WRC-12) are appropriate for the 6/4 GHz and 14/10/11/12 GHz frequency bands, and whether it is appropriate to reduce the coordination arc in the 30/20 GHz band,

The ITU-R has conducted studies related to *resolves* 1 and 2 for the 6/4, 14/10/11/12, 21.4-22, and 30/20 GHz frequency bands.

Resolves 1

It is recognized that *resolves* 1 considers the effects of changing both the criterion itself (currently $\Delta T/T$) and the equivalent criterion threshold (currently 6%). In the Conference Preparatory Meeting (CPM) Report for this issue, Option 1A proposes changes to both the criterion and the equivalent criterion threshold, aligning No. 9.41 with the No. 11.32A evaluations while converting the Rule of Procedure on No. 11.32A into regulatory text. Options 1B and 1C propose no change to the criterion or the criterion threshold under No. 9.41, but propose changing the criterion for No. 11.32A evaluation to a PFD mask. Option 1D proposes no change to either the criterion or the criterion threshold under Nos. 9.41 and 11.32A. The United States supports Option 1D.

With regard to Option 1A:

- There is general concern that changing two items simultaneously may result in unforeseen consequences / difficulties in implementation.
- The $\Delta T/T$ value of 6 % is justified based on the fact that satellite links have typical interference margins of 1dB. This is particularly relevant for coordination of networks with larger orbital separations than the coordination arc value. The figures of $\Delta T/T$ for networks within the coordination arc are not relevant as $\Delta T/T$ is a parameter used to launch the coordination process but not for conducting detailed coordination between networks.
- It is noted that the ITU-R WP 4A Chairman's Report (4A/591) states, "this draft CPM text calls for, in part, converting the existing Rule of Procedure on RR No. 11.32A into regulatory text, and this could prove to be a very challenging task."
- Studies submitted to the ITU have shown that changing the criterion from $\Delta T/T$ to C/I (while not changing the equivalent criterion threshold) does not significantly reduce the number of Affected Administrations that must be dealt with in order to complete coordination of a satellite network. The United States' experience is that the number of Affected Administrations is a more important

qualitative determinant of how difficult it will be to complete coordination, more so than the number of networks.

- It is noted the Radiocommunication Bureau (BR) Director's contribution (4A/579) supports $\Delta T/T$ as the criterion, stating,

The Bureau concludes that the C/I criterion alone for identifying potentially affected administrations / networks under RR Nos. 9.7 and 9.41 would not significantly reduce coordination requirement. Results of simulation demonstrate that the orbital separation required establishing coordination requirement using C/I criterion would not significantly improve the situation in the absence of any other mechanism.

The Bureau considers that simple transition to C/I would not address the problem of "effectiveness and appropriateness" of the existing and proposed criteria while increasing the workload of the Bureau to implement the changes and the process.

With regard to Options 1A, 1B, and 1C:

- A study submitted to the ITU has shown that the proposed PFD masks will not provide uniform protections to incumbent networks. The study particularly showed that PFD masks calculated on the basis of the $\Delta T/T = 6\%$ and 20% criteria will not protect networks already in operation or notified in accordance with the provisions of the RR.

- It is noted that the PFD masks were created using the reference earth station power limits contained in RR Article 21 and, however, are not shown to adequately protect networks that are more sensitive.

- Studies performed before the beginning of the cycle were inconclusive. The report on those studies stated: "Further study is required to determine a set of appropriate assumptions about C/N degradation values that are representative of the environment in which deployed satellites operate." Yet no additional studies were presented to the ITU on the subject under this agenda item,

Resolves 2

In the CPM Report for this issue, Option 2A proposes changes to the coordination arc for the 6/4 and 14/10/11/12 GHz frequency bands. Option 2B proposes changes to the coordination arc for the 6/4, 14/10/11/12 and 30/20 GHz frequency bands. Option 2C proposes no changes. The United States supports Option 2A, noting that the content of Option 2A (i.e., reducing the 6/4 GHz coordination arc to 6° and reducing the 14/10/11/12 GHz coordination arc to 5°) was originally studied and proposed during the WRC-12 cycle but was not implemented.

With regard to Option 2B, an ITU-R study evaluated the density of GSO FSS space stations using the 29.5-30.0 GHz/19.7-20.2 GHz bands that have actually been brought into use (active) or placed into construction (planned) according to publicly available publications. The analysis indicated that the current deployment of Ka-band networks is not uniformly dense throughout the GSO. While the average orbital separation between stations was on the order of 5 degrees, its standard deviation was greater than 5 degrees and the maximum separation was at least 27 degrees when taken both active and planned networks into account. This reveals that it is not yet appropriate for the protection of incumbent Ka-band networks to reduce the coordination arc in the 29.5-30.0 GHz / 19.7-20.2 GHz bands from its current value as contained in Appendix 5 of the Radio Regulations.

With regard to Option 2C, the United States notes that changes to the coordination arc were studied prior to WRC-12 and that some of the changes proposed in Options 2A and 2B (i.e., reducing the 6/4 GHz coordination arc to 6° and reducing the 14/10/11/12 GHz coordination arc to 5°) were originally proposed during the WRC-12 cycle.

Summary

Based on studies conducted within the ITU-R related to *resolves* 1 and 2 for the 6/4, 14/10/11/12 and 30/20 GHz frequency bands, the United States supports CPM Report’s Options 1D and 2A, as shown in the summary chart below.

		Res 756 (WRC-12)				
		Resolves 1				Resolves 2
		9.41		11.32A		
		Criterion	Criterion Threshold	Criterion	Criterion Threshold	Coord Arc
Band	6/4	NOC ($\Delta T/T$)	NOC (6%)	NOC (C/I)	NOC (12 dB)	8° → 6°
	14/10/11/12	NOC ($\Delta T/T$)	NOC (6%)	NOC (C/I)	NOC (12 dB)	7° → 5°
	30/20	NOC ($\Delta T/T$)	NOC (6%)	NOC (C/I)	NOC (12 dB)	NOC (8°)

The No Change aspects of the proposal are reflected in Articles 9 and 11 and Appendices 5 and 8. The changes made by this proposal are in Appendix 5.

Proposals:

NOC **USA/9.1.2/1**

ARTICLE 8

Status of frequency assignments recorded in the Master International Frequency Register

Reasons: No changes to RR Appendix 8 with respect to *resolves* 1.

NOC **USA/9.1.2/2**

ARTICLE 9

Procedure for effecting coordination with or obtaining agreement of other administrations^{1, 2, 3, 4, 5, 6, 7, 8, 8bis} (WRC-12)

Reasons: No changes to the provisions of RR Articles 9 in respect of *resolves* 1.

NOC USA/9.1.2/3

ARTICLE 11

Notification and recording of frequency assignments^{1, 2, 3, 4, 5, 6, 7, 7bis} (WRC-12)

Reasons: No changes to the provisions of RR 11 in respect of *resolves* 1.

APPENDIX 5 (REV.WRC-12)

Identification of administrations with which coordination is to be effected or agreement sought under the provisions of Article 9

MOD USA/9.1.2/4

TABLE 5-1 (Rev.WRC-15)
Technical conditions for coordination
(see Article 9)

Reference of Article 9	Case	Frequency bands (and Region) of the service for which coordination is sought	Threshold/condition	Calculation method	Remarks
No. 9.7 GSO/GSO	A station in a satellite network using the geostationary-satellite orbit (GSO), in any space radiocommunication service, in a frequency band and in a Region where this service is not subject to a Plan, in respect of any other satellite network using that orbit, in any space radiocommunication service in a frequency band and in a Region where this service is not subject to a Plan, with the exception of the coordination between earth stations operating in the opposite direction of transmission	1) 3 400-4 200 MHz 5 725-5 850 MHz (Region 1) and 5 850-6 725 MHz 7 025-7 075 MHz 2) 10.95-11.2 GHz 11.45-11.7 GHz 11.7-12.2 GHz (Region 2) 12.2-12.5 GHz (Region 3) 12.5-12.75 GHz (Regions 1 and 3) 12.7-12.75 GHz (Region 2) and 13.75-14.5 GHz	i) Bandwidth overlap, and ii) any network in the fixed-satellite service (FSS) and any associated space operation functions (see No. 1.23) with a space station within an orbital arc of $\pm 86^\circ$ of the nominal orbital position of a proposed network in the FSS i) Bandwidth overlap, and ii) any network in the FSS or broadcasting-satellite service (BSS), not subject to a Plan, and any associated space operation functions (see No. 1.23) with a space station within an orbital arc of $\pm 75^\circ$ of the nominal orbital position of a proposed network in the FSS or BSS, not subject to a Plan		With respect to the space services listed in the threshold/condition column in the bands in 1), 2), 3), 4), 5), 6), 7) and 8), an administration may request, pursuant to No. 9.41, to be included in requests for coordination, indicating the networks for which the value of $\Delta T/T$ calculated by the method in § 2.2.1.2 and 3.2 of Appendix 8 exceeds 6%. When the Bureau, on request by an affected administration, studies this information pursuant to No. 9.42, the calculation method given in § 2.2.1.2 and 3.2 of Appendix 8 shall be used

Reasons: No changes with respect to *resolves* 1 (in the Remarks column); change the coordination arc in 6/4, 14/10/11/12 GHz frequency bands (*resolves* 2)

TABLE 5-1 (Rev.WRC-12)
Technical conditions for coordination
(see Article 9)

Reference of Article 9	Case	Frequency bands (and Region) of the service for which coordination is sought	Threshold/condition	Calculation method	Remarks
No. 9.7 GSO/GSO	A station in a satellite network using the geostationary-satellite orbit (GSO), in any space radiocommunication service, in a frequency band and in a Region where this service is not subject to a Plan, in respect of any other satellite network using that orbit, in any space radiocommunication service in a frequency band and in a Region where this service is not subject to a Plan, with the exception of the coordination between earth stations operating in the opposite direction of transmission	1) 3 400-4 200 MHz 5 725-5 850 MHz (Region 1) and 5 850-6 725 MHz 7 025-7 075 MHz 2) 10.95-11.2 GHz 11.45-11.7 GHz 11.7-12.2 GHz (Region 2) 12.2-12.5 GHz (Region 3) 12.5-12.75 GHz (Regions 1 and 3) 12.7-12.75 GHz (Region 2) and 13.75-14.5 GHz	i) Bandwidth overlap, and ii) any network in the fixed-satellite service (FSS) and any associated space operation functions (see No. 1.23) with a space station within an orbital arc of $\pm 8^\circ$ of the nominal orbital position of a proposed network in the FSS i) Bandwidth overlap, and ii) any network in the FSS or broadcasting-satellite service (BSS), not subject to a Plan, and any associated space operation functions (see No. 1.23) with a space station within an orbital arc of $\pm 7^\circ$ of the nominal orbital position of a proposed network in the FSS or BSS, not subject to a Plan		With respect to the space services listed in the threshold/condition column in the bands in 1), 2), 3), 4), 5), 6), 7) and 8), an administration may request, pursuant to No. 9.41, to be included in requests for coordination, indicating the networks for which the value of $\Delta T/T$ calculated by the method in § 2.2.1.2 and 3.2 of Appendix 8 exceeds 6%. When the Bureau, on request by an affected administration, studies this information pursuant to No. 9.42, the calculation method given in § 2.2.1.2 and 3.2 of Appendix 8 shall be used

TABLE 5-1 (continued) (Rev.WRC-12)

Reference of Article 9	Case	Frequency bands (and Region) of the service for which coordination is sought	Threshold/condition	Calculation method	Remarks
No. 9.7 GSO/GSO (cont.)		3) 17.7-20.2 GHz, (Regions 2 and 3), 17.3-20.2 GHz (Region 1) and 27.5-30 GHz	i) Bandwidth overlap, and ii) any network in the FSS and any associated space operation functions (see No. 1.23) with a space station within an orbital arc of $\pm 8^\circ$ of the nominal orbital position of a proposed network in the FSS		
		4) 17.3-17.7 GHz (Regions 1 and 2)	i) Bandwidth overlap, and ii) a) any network in the FSS and any associated space operation functions (see No. 1.23) with a space station within an orbital arc of $\pm 8^\circ$ of the nominal orbital position of a proposed network in the BSS, or b) any network in the BSS and any associated space operation functions (see No. 1.23) with a space station within an orbital arc of $\pm 8^\circ$ of the nominal orbital position of a proposed network in the FSS		

TABLE 5-1 (continued) (Rev.WRC-12)

Reference of Article 9	Case	Frequency bands (and Region) of the service for which coordination is sought	Threshold/condition	Calculation method	Remarks
No. 9.7		5) 17.7-17.8 GHz	i) Bandwidth overlap, and		

GSO/GSO (cont.)		6) 18.0-18.3 GHz (Region 2) 18.1-18.4 GHz (Regions 1 and 3)	<p>ii) a) any network in the FSS and any associated space operation functions (see No. 1.23) with a space station within an orbital arc of $\pm 8^\circ$ of the nominal orbital position of a proposed network in the BSS,</p> <p>or</p> <p>b) any network in the BSS and any associated space operation functions (see No. 1.23) with a space station within an orbital arc of $\pm 8^\circ$ of the nominal orbital position of a proposed network in the FSS</p> <p>NOTE – No. 5.517 applies in Region 2.</p> <p>i) Bandwidth overlap, and</p> <p>ii) any network in the FSS or meteorological-satellite service and any associated space operation functions (see No. 1.23) with a space station within an orbital arc of $\pm 8^\circ$ of the nominal orbital position of a proposed network in the FSS or the meteorological-satellite service</p>		
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TABLE 5-1 (continued) (Rev.WRC-12)

Reference of Article 9	Case	Frequency bands (and Region) of the service for which coordination is sought	Threshold/condition	Calculation method	Remarks
No. 9.7 GSO/GSO (cont.)		6bis) 21.4-22 GHz (Regions 1 and 3)	<p>i) Bandwidth overlap; and</p> <p>ii) any network in the BSS and any associated space operation functions (see No. 1.23) with a space station within an orbital arc of $\pm 12^\circ$ of the nominal orbital position of a proposed network in the BSS (see also Resolutions 554 (WRC-12) and 553</p>		No. 9.41 does not apply.

		<p>7) Bands above 17.3 GHz, except those defined in § 3) and 6)</p> <p>8) Bands above 17.3 GHz except those defined in § 4), 5) and <i>6bis</i>)</p>	<p>(WRC-12).</p> <p>i) Bandwidth overlap, and</p> <p>ii) any network in the FSS and any associated space operation functions (see No. 1.23) with a space station within an orbital arc of $\pm 8^\circ$ of the nominal orbital position of a proposed network in the FSS (see also Resolution 901 (Rev.WRC-07))</p> <p>i) Bandwidth overlap, and</p> <p>ii) any network in the FSS or BSS, not subject to a Plan, and any associated space operation functions (see No. 1.23) with a space station within an orbital arc of $\pm 16^\circ$ of the nominal orbital position of a proposed network in the FSS or BSS, not subject to a Plan, except in the case of a network in the FSS with respect to a network in the FSS (see also Resolution 901 (Rev.WRC-07))</p>		
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Reasons: No changes with respect to resolves 1 (in the Remarks column). No change in 30/20 GHz frequency band (resolves 2).