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| **31 MEETING OF PERMANENT****CONSULTATIVE COMMITTEE II:****RADIOCOMMUNICATIONS****July 16 to 20, 2018****Guadalajara, Jalisco, Mexico** | **OEA/Ser.L/XVII.4.2.31****CCP.II-RADIO/doc. /18****5 June 2018****Original:**  |
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|  | **U.S. PROPOSAL ON WRC-19 AGENDA ITEM 1.4** |  |
|  | **(Item on the Agenda: 3.1)** |  |
|  | **(Document submitted by the delegation of the United States of America)** |  |

Introduction

This document contains an attachment including the USA proposal on WRC-19 Agenda Item 1.4 for consideration in CITEL’s preparation to WRC-19 Agenda Item 1.4.

**Attachment**

**Agenda Item 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 broadcasting-satellite service within the Plan, and existing and planned fixed-satellite service networks*.

**Background:** Annex 7 to RR Appendix 30 (Rev.WRC-15) contains, the following orbital position limitations for BSS:

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| **Annex 7 Limitation** | Region and Service of interfering assignments |  **Region and Service of impacted assignments** | **Frequency band** | **Limitation description** |
| A1(part a) | Region 1 BSS | Region 2 FSS (Atlantic) | 11.7-12.2 GHz | No assignments in the Region 1 List further west than 37.2°W |
| A1(part b) | Region 2 FSS (Pacific) | No assignments in the Region 1 List further east than 146°E |
| Region 3 BSS subject to Appendix **30** |
| A2a | Region 2 BSS | Region 1 FSS (Atlantic) | 12.5-12.7 GHz | No modification in the Region 2 Plan further east than 54°W |
| A2b | Region 1 BSS subject to Appendix **30** | 12.2-12.5 GHz | No modification in the Region 2 Plan further east than 44°W |
| A2c | Region 3 FSS  | 12.2-12.7 GHz | No modification in the Region 2 Plan further west than 175.2°W |
| Region 1 BSS subject to Appendix **30** | 12.2-12.5 GHz |
| Region 1 FSS (Pacific) | 12.5-12.7 GHz |
| A3(part a) | Region 1 BSS | Region 2 FSS | 11.7-12.2 GHz | No assignments in the Regions 1 & 3 List outside specific allowable portions of the orbital arc between 37.2°W and 10°E |
| A3(part b) | Max. e.i.r.p. of 56 dBW for assignments in the Regions 1 & 3 List at specific allowable portions of the orbital arc between 37.2°W and 10°E |
| A3(part c) | Max. power flux density of -138 dB(W/(m2 . 27 MHz)) at any point in Region 2 by assignments in the Regions 1 & 3 List located at 4°W and 9°E |
| B | Region 2BSS | Region 2 BSS subject to Appendix **30** | 12.2-12.7 GHz | Required agreement of administrations having to space stations in the same cluster when an administration may locate a satellite within this cluster |

The FSS in the same frequency bands is not the subject to orbital positions limitations.

Revision/suppression of the Annex 7 orbital position limitations would provide satellite operators an additional orbital/spectrum resource that is already allocated.

Due to the Atlantic Ocean, which provides geographical separation between the coverage areas in Region 1 and Region 2, the potential for interference between the FSS and the BSS in these Regions is significantly reduced.

The sharing studies conducted to investigate the possible suppression of Limitation A1 (part a) show that, by assuming 20 dB geographic discrimination, representative BSS and FSS networks serving different Regions can co-exist with orbital separations as small as 0.5 degree (for FSS versus BSS) and 2 degrees (for BSS versus FSS), considering the identified carrier parameters and a 6 dB edge of coverage. These small orbital separations demonstrate that the restriction in the orbital position further west than 37.2°W in Limitation A1 (part a) could be suppressed to allow an Appendix **30** Region 1 List system at an orbital position further west than 37.2°W.

Similar conclusions were reached with respect to Limitations A2a and A2b, which could likewise be suppressed.

However, due to the very close proximity between Chukotka (Region 1) and Alaska (Region 2), separated only by the Bering Strait and between land masses in Region 1 and Region 3, there is very little room for geographic discrimination in situations involving the Pacific Ocean, and consequently suppressing Limitations A1 (part b) and A2c cannot be justified without additional considerations. The sharing studies show that in the case of absence of geographic discrimination representative BSS and FSS networks serving different Regions can co-exist with orbital separations of 4.4 degrees (for Region 1 FSS versus Region 2 BSS) and 5.8 degrees (for Region 2 BSS versus Region 1 FSS), depending on the carrier parameters (for the EOC at 6 dB case).

In specific situations with respect to Region 2 FSS vs. Region 1 BSS or with respect to Region 1 FSS vs. Region 2 BSS with small orbital separations (i.e. a Region 2 FSS network intending to operate in an area close to the Region 1 border and with a service area very close to that of a Region 1 BSS or a Region 1 FSS network intending to operate in an area close to the Region 2 border and with a service area very close to that of a Region 2 BSS), the suppression of Limitation A1 (part a) or Limitation A2a could impose additional constraints on these Region 1 and Region 2 FSS networks.

This is due to the fact that the pfd limits applicable to Region 2 FSS networks for protection of Region 1 BSS networks and to Region 1 FSS networks for protection of Region 2 BSS networks, contained in Annex 4 of Appendix **30,** are a function of the orbital separation to the closest affected BSS network in Region 1 or Region 2. If Limitation A1 (part a) is suppressed, future Region 1 BSS networks can be located much closer to Region 2 FSS networks that were previously unencumbered, and therefore restrict the ability of future Region 2 FSS networks, in some particular cases, to operate in the same manner that Region 2 FSS networks submitted before this Annex 7 limitation is suppressed. Likewise, if Limitation A2a is suppressed, future Region 2 BSS networks can be located much closer to Region 1 FSS networks that were previously unencumbered, and therefore restrict the ability of future Region 1 FSS networks, in some particular cases, to operate in the same manner that Region 1 FSS networks submitted before this Annex 7 limitation is suppressed.

In order to mitigate that effect, it is proposed to use the Region 1 and Region 2 BSS test points instead of the service area definition for the coordination with the FSS through a new Resolution [1.4] (WRC-19). This approach is consistent with the use of test points for intra-BSS coordination.

With respect to limitations A3a and A3b, there may be a risk that an existing satellite network that implemented earth stations with antenna size 40 cm under the current regulatory regime defined by the current orbit limitations in Annex 7, would not be able to continue its operation due to the possible additional level of interference that an incumbent might be forced to accept, unless additional measures are considered. Such a situation would be in contradiction to recognizing b) of Resolution 557 (WRC-15), stating: “that existing FSS networks operating in the frequency bands mentioned in considering b) and BSS networks implemented in accordance with the current provisions of Annex 7 to Appendix 30 shall continue to be protected.” As a result, it is proposed that such BSS networks with antenna diameter less than 60 cm are protected with a specific and adequate PFD mask through a new Resolution [1.4] (WRC-19), in line with the PFD mask proposed in Method A3-2 of the draft CPM text.

With respect to Section B of Annex 7, its maintenance is important for the Region 2 Plan whose original assignments were based on the cluster concept. Therefore, no change is proposed to that section.

**Proposal:**

**MOD USA/1.4/1**

APPENDIX 30 (REV.WRC‑19)\*

**Provisions for all services and associated Plans and List1 for
the broadcasting-satellite service in the frequency bands
11.7-12.2 GHz (in Region 3), 11.7-12.5 GHz (in Region 1)
         and 12.2-12.7 GHz (in Region 2)**    (WRC‑03)

**MOD USA/1.4/2**

ANNEX 7     (Rev.WRC‑19)

**Orbital position limitations**

1) No broadcasting satellite serving an area in Region 1 and using a frequency in the band 11.7-12.2 GHz shall occupy a nominal orbital position furthereast than 146° E.

 Broadcasting satellites serving an area in Region 1 using a frequency in the band 11.7-12.2 GHz and occupying a nominal orbital position further west than 37.2° W shall be in accordance with Resolution [1.4] (WRC-19).

2) No broadcasting satellite serving an area in Region 2 that involves an orbital position different from that contained in the Region 2 Plan shall occupy a nominal orbital position

 *c)*further west than 175.2° W in the band 12.2-12.7 GHz.

 Broadcasting satellites not operating under an original Region 2 Plan assignment in Article 11 serving an area in Region 2 using a frequency in the band 12.5-12.7 GHz and occupying a nominal orbital position further east than 54° W shall be in accordance with Resolution [1.4] (WRC-19).

 Broadcasting satellites not operating under an original Region 2 Plan assignment in Article 11 serving an area in Region 2 using a frequency in the band 12.5-12.7 GHz and occupying a nominal orbital position further east than 54° W shall be in accordance with Resolution [1.4] (WRC-19).

**Reasons:** To provide the BSS additional orbital resources while ensuring the protection of, and without imposing additional constraints on existing and planned FSS networks.

**MOD USA/1.4/3**

3) Broadcasting satellite serving an area in Regions 1 or 3 using a frequency in the band 11.7-12.2 GHz, occupying a nominal orbital position within the orbital arc of the geostationary-satellite orbit between 37.2° W and 10° E, with an earth station antenna diameter lower than 60 cm and for which complete Appendix 4 information had been received by the Bureau under § 4.1.3 of Appendix **30** prior to 28 November 2015; and for which complete Appendix **4** information had been received by the Bureau under § 4.1.12 of Appendix **30** prior to 23 November 2019; and for which the complete due diligence information, in accordance with Annex 2 to Resolution **49 (Rev.WRC-15)**, had been received by the Bureau prior to 23 November 2019; and for which complete Appendix **4** information had been received by the Bureau under § 5.1.2 of Appendix **30** prior to 23 November 2019; and which had been brought into use prior to 23 November 2019 and for which the date of bringing into use had been confirmed to the Bureau, the pfd mask contained in Annex 1 section 1 of Appendix 30 shall be replaced by the pfd masks contain in Resolution [1.4] (WRC-19).

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**Reasons:** To protect BSS networks with antenna diameter less than 60 cm with a specific and adequate PFD mask.

**NOC USA/1.4/4**

B The Region 2 Plan is based on the grouping of the space stations in nominal orbital positions of ±0.2° from the centre of the cluster of satellites. Administrations may locate those satellites within a cluster at any orbital position within that cluster, provided they obtain the agreement of administrations having assignments to space stations in the same cluster. (See § 4.13.1 of Annex 3 to Appendix **30A**.)

**Reasons:** No change is proposed to Annex 7 limitation B, as it forms the basis of the original Region 2 Plan.

**ADD USA/1.4/5**

RESOLUTION [**1.4**] (WRC‑19)

**Transitional measures for certain broadcasting-satellite/fixed-satellite service systems in the bands 11.7-12.2 and 12.2-12.7 GHz**

The World Radiocommunication Conference (Geneva, 2019),

*considering*

*a)* that World Radiocommunication Conference 2015 decided to conduct studies on, review, and identify possible revisions to, 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 in the List and the future of broadcasting-satellite service (BSS) networks and existing fixed-satellite service (FSS) networks.

*b)* that the provisions applying to the BSS in the frequency bands 11.7-12.5 GHz in Region 1, 12.2-12.7 GHz in Region 2 and 11.7-12.2 GHz in Region 3 are contained in Appendix **30**;

*c)* that FSS has primary allocations in the frequency bands 12.5-12.75 GHz in Region 1, 11.7-12.2 GHz in Region 2 and 12.2-12.75 GHz in Region 3, while unplanned BSS has a primary allocation in 12.5-12.7 GHz in Region 3;

*d)* that this Conference suppressed the limitation in Annex **7** of Appendix **30** that prevented broadcasting satellites serving an area in Region 1 and using frequency assignments in the band 11.7-12.2 GHz from occupying a nominal orbital position further west than 37.2° W;

*e)* that this Conference suppressed the limitation in Annex **7** of Appendix **30** that prevented broadcasting satellites serving an area in Region 2 and using frequency assignments in the band 12.5-12.7 GHz from occupying a nominal orbital position further east than 54°W;

*f)* that this Conference suppressed the limitation in Annex **7** of Appendix **30** that prevented broadcasting satellites serving an area in Regions 1 or 3 and using frequency assignments in the band 11.7-12.2 GHz from occupying a nominal orbital position outside allowable portions of the orbital arc between 37.2°W and 10°E;

*g)* that the result of those suppressions must ensure the protection of, and cannot impose 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;

*recognizing*

*a)* that WRC-2000 developed new Plans for Regions 1 and 3 assuming digital BSS and feeder-link assignments;

*b)* that existing FSS and unplanned BSS networks operating in the frequency bands mentioned in *considering c)* and planned BSS networks implemented in accordance with the provisions of Annex 7 to Appendix **30** (Rev.WRC-15) prior to WRC-19 shall continue to be protected;

*c)* that the frequency bands 11.7-12.2 GHz in Region 3, 11.7-12.5 GHz in Region 1 and 12.2-12.7 GHz in Region 2 are widely used by BSS networks, subject to the provisions of Annex 7 to Appendix **30** (Rev.WRC-15) prior to WRC-19;

*d)* that the frequency bands 12.5-12.75 GHz in Region 1, 11.7-12.2 GHz in Region 2 and 12.2-12.75 GHz in Region 3 are widely used by FSS networks.

*resolves*

1 that, with respect to § 7.1 *a)*, 7.2.1 *b)* and 7.2.1 *c)* of Article 7 of Appendix **30**, for the coordination of a transmitting space station in the FSS (space-to-Earth) of Region 2 with a broadcasting satellite serving an area in Region 1 and using a frequency assignment in the band 11.7-12.2 GHz with a nominal orbital position further west than 37.2°W, the conditions contained in Annex 4 to Appendix **30** are replaced by the conditions in Annex 1 to this resolution;

2 that, with respect to § 7.1 *a)*, 7.2.1 *b)* and 7.2.1 *c)* of Article 7 of Appendix **30**, for the coordination of a transmitting space station in the FSS (space-to-Earth) of Region 1 with a broadcasting satellite serving an area in Region 2 and using a frequency assignment in the band 12.5-12.7 GHz with a nominal orbital position further east than 54°W and not appearing in the original Region 2 BSS Plan in Article 11, the conditions contained in Annex 4 to Appendix **30** are replaced by the conditions in Annex 2 to this resolution.

3 that, with respect to § 4.1.1 *b)* of Article 4 of Appendix **30**, for the protection of a transmitting space station in the BSS serving an area in Regions 1 or 3 using a frequency in the band 11.7-12.2 GHz, occupying a nominal orbital position within the orbital arc of the geostationary-satellite orbit between 37.2° W and 10° E, with an earth station antenna diameter lower than 60 cm and for which complete Appendix 4 information had been received by the Bureau under § 4.1.3 of Appendix **30** prior to 28 November 2015; and for which complete Appendix **4** information had been received by the Bureau under § 4.1.12 of Appendix **30** prior to 23 November 2019; and for which the complete due diligence information, in accordance with Annex 2 to Resolution **49 (Rev.WRC-15)**, had been received by the Bureau prior to 23 November 2019; and for which complete Appendix **4** information had been received by the Bureau under § 5.1.2 of Appendix **30** prior to 23 November 2019; and which had been brought into use prior to 23 November 2019 and for which the date of bringing into use had been confirmed to the Bureau, the pfd mask contained in Annex 1 section 1 of Appendix 30 shall be replaced by the pfd masks contain in Annex 3 to this resolution.

ANNEX 1 TO RESOLUTION 1.4 (WRC-19)

With respect to § 7.1 *a)*, 7.2.1 *b)* and 7.2.1 *c)* of Article 7 of Appendix **30**, coordination of a transmitting space station in the fixed-satellite service (FSS) (space-to-Earth) of Region 2 is required with a broadcasting satellite serving an area in Region 1 and using a frequency assignment in the band 11.7-12.2 GHz with a nominal orbital position further west than 37.2°W when, under assumed free-space propagation conditions, the power flux-density at any test point of its service area of the overlapping frequency assignments in the BSS exceeds the following values: (WRC-19)

–147    dB(W/(m2 27 MHz)) for 00.23

–135.7 17.74 log dB (W/(m2 27 MHz)) for 0.232.0

–136.7 1.66 dB(W/(m2 27 MHz)) for 2.03.59

–129.2 25 log dB(W/(m2 27 MHz)) for 3.5910.57

–103.6 dB(W/(m2 27 MHz)) for 10.57

where  is the minimum geocentric orbital separation in degrees between the wanted and interfering space stations, taking into account the respective East-West station-keeping accuracies.

ANNEX 2 TO RESOLUTION 1.4 (WRC-19)

With respect to § 7.1 *a)*, 7.2.1 *b)* and 7.2.1 *c)* of Article 7 of Appendix **30**, coordination of a transmitting space station in the fixed-satellite service (FSS) (space-to-Earth) of Region 1 is required with a broadcasting satellite serving an area in Region 2 and using a frequency assignment in the band 12.5-12.7 GHz with a nominal orbital position further east than 54°W and not appearing in the original Region 2 BSS Plan in Article 11 when, under assumed free-space propagation conditions, the power flux-density at any test point of its service area of the overlapping frequency assignments in the BSS exceeds the following values: (WRC-19)

–147    dB(W/(m2 27 MHz)) for 00.23

–135.7 17.74 log dB (W/(m2 27 MHz)) for 0.231.8

–134.0 0.89 dB(W/(m2 27 MHz)) for 1.85.0

–129.2 25 log dB(W/(m2 27 MHz)) for 5.010.57

–103.6 dB(W/(m2 27 MHz)) for 10.57

where  is the minimum geocentric orbital separation in degrees between the wanted and interfering space stations, taking into account the respective East-West station-keeping accuracies.

ANNEX 3 TO RESOLUTION 1.4 (WRC-19)

With respect to § 4.1.1 b*)* of Article 4 of Appendix **30**, For the protection of assignments in the band 11.7-12.2 GHz occupying a nominal orbital position within the orbital arc of the geostationary-satellite orbit between 37.2° W and 10° E, with an earth station antenna diameter lower than 60 cm,

– for which complete Appendix 4 information had been received by the Bureau under § 4.1.3 of Appendix **30** prior to 28 November 2015; and

– for which complete Appendix **4** information had been received by the Bureau under § 4.1.12 of Appendix **30** prior to 23 November 2019; and

– for which the complete due diligence information, in accordance with Annex 2 to Resolution **49 (Rev.WRC-15)**, had been received by the Bureau prior to 23 November 2019; and

– for which complete Appendix **4** information had been received by the Bureau under § 5.1.2 of Appendix **30** prior to 23 November 2019; and

– which had been brought into use prior to 23 November 2019 and for which the date of bringing into use had been confirmed to the Bureau.

The following values shall be used:

for antenna size of 40 cm:

 –133.2 + 0.74 θ2 dB(W/(m2 · 27 MHz)) for 0° ≤ θ < 5.54°

 –129.2 + 25 log θ dB(W/(m2 · 27 MHz)) for 5.54° ≤ θ < 9°

for antenna size of 45 cm:

 –134.2 + 0.93 θ2 dB(W/(m2 · 27 MHz)) for 0° ≤ θ < 4.90°

 –129.2 + 25 log θ dB(W/(m2 · 27 MHz)) for 4.90° ≤ θ < 9°

**Reasons:** To provide the BSS additional orbital resources while ensuring the protection of, and without imposing additional constraints on existing and planned FSS networks as well as to protect BSS networks with antenna diameter less than 60 cm with a specific and adequate PFD mask.

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