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|  |  Doc. CPG(18)017 Annex IV-04 |
| CPG19-5 |
| Budapest, Hungary, 08th - 11th January 2018 |
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| Date issued:  | 11th January 2018 |
| Source:  | CPG19-5 Minutes |
| Subject:  | Draft CEPT Brief on WRC-19 Agenda Item 1.4 |
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| Summary:  |
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| Proposal: |

DRAFT CEPT BRIEF ON AGENDA ITEM 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-12), 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;

# ISSUE

Resolution 557 (WRC-15) “Consideration of possible revision of Annex 7 to Appendix 30 of the Radio Regulations” invites:

to conduct studies on, review, and identify possible revisions to, if necessary, the limitations mentioned in Annex 7 to Appendix 30 (Rev.WRC-12), while ensuring the protection of, and without imposing additional constraints on, assignments in the Plan and in the List and the future of BSS networks mentioned in recognizing c) and existing and planned FSS networks mentioned in recognizing d).

# Preliminary CEPT position

CEPT supports the deletions of the limitations:

* Limitation A1 (part a) (No assignments in the Region 1 List further west than 37.2°W)
* Limitation A1 (part b) (No assignments in the Region 1 List further east than 146°E)
* Limitation A2a (No modification in the Region 2 Plan further east than 54°W)
* Limitation A2b (No modification in the Region 2 Plan further east than 44°W)
* Limitation A3 (part b) (Maximum 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 specified in Table 1 of Annex 7 to Appendix 30)
* Limitation A3 (part c) (Maximum 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)

CEPT is considering the possible deletions of the limitations:

* Limitation A2c (No modification in the Region 2 Plan further west than 175.2°W)

CEPT preliminarily opposes the removal of the A3 (part a) limitation (No assignments in the Regions 1 & 3 List outside specific allowable portions of the orbital arc between 37.2°W and 10°E specified in Table 1 of Annex 7 to Appendix 30). To guarantee the protection of the BSS satellite networks implemented in accordance with the current provisions of Annex 7 to Appendix 30 (which includes antennas smaller than 60 cm in the allowable portions of the orbital arc), CEPT proposes the following modification to Table1 of Annex 7 to Appendix 30:

Allowable portions of the orbital arc between 37.2° W and 10°E for assignments in the Regions 1 & 3 Plan and List

|  |
| --- |
| Allowable orbital position |
| 37.2°Wto35°W | 33.5°Wto32.5°W | 32°Wto28°W | 26°Wto0°E |  |  |  |  |  | 2.8°Eto6.8°E | 9°E |

CEPT is of the view that Limitation B deals with the grouping concept of space stations in the Region 2 Plan and therefore decisions over this limitation are out of the scope of CEPT.

# Background

The Annex 7 to Appendix 30 (Rev. WRC-12) contains several orbital position limitations applicable to the 3 Regions for specific sub-band of the band 11.7-12.7 GHz. To simplify the readiness of this CEPT Brief, the same nomenclature as agreed by WP 4A was retained as shown in Table 1 below.

Table 1: Annex 7 to Appendix 30 (Rev. WRC-12) limitations

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Annex 7 Limitation | Region and Service of interfering assignments | Region and Service of impacted assignments | Frequency band, GHz | Limitation description | Associated regulatory text |
| A1(part a) | Region 1BSS | Region 2FSS (Atlantic) | 11.7-12.2 | No assignments in the Region 1 List further west than 37.2°W | Section A 1) |
| A1(part b) | Region 2FSS (Pacific) | No assignments in the Region 1 List further east than 146°E |
| Region 3BSS subject to Appendix 30 |
| A2a | Region 2BSS | Region 1FSS (Atlantic) | 12.5-12.7 | No modification in the Region 2 Plan further east than 54°W | Section A 2) a) |
| A2b | Region 1BSS subject to Appendix 30 | 12.2-12.5 | No modification in the Region 2 Plan further east than 44°W | Section A 2) b) |
| A2c | Region 3FSS | 12.2-12.7 | No modification in the Region 2 Plan further west than 175.2°W | Section A 2) c) |
| Region 1BSS | 12.2-12.5 |
| Region 1FSS (Pacific) | 12.5-12.7 |
| A3(part a) | Region 1BSS | Region 2FSS | 11.7-12.2 | No assignments in the Regions 1 & 3 List outside specific allowable portions of the orbital arc between 37.2°W and 10°E (see Table 2) | Section A 3) |
| 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 (seeTable 3) |
| 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 2BSS | 12.2-12.7 | Required agreement of administrations having to space stations in the same cluster when an administration may locate a satellite within this cluster | Section B |

Table 2: Allowable portions of the orbital arc between 37.2° W and 10°E for assignments in the Regions 1 & 3 Plan and List

|  |
| --- |
| Allowable orbital position |
| 37.2°Wto36°W | 33.5°Wto32.5°W | 30°Wto29°W | 26°Wto24°W | 20°Wto18°W | 14°Wto12°W | 8°Wto6°W | 4°W | 2°Wto0°E | 4°Eto6°E | 9°E |

Table 3: Portions of the orbital arc between 37.2° W and 10°E for assignments in the Regions 1 & 3 List with Max. e.i.r.p. of 56 dBW

|  |
| --- |
| Orbital position with Max. e.i.r.p. of 56 dBW limitation |
| ] 36.8°W ; 36°W ] |
| ] 33.5°W ; 32.5°W ] |
| ] 30°W ; 29°W ] |
| [ 26°W ; 25.2°W [ |
| ] 24.8°W ; 24°W ] |
| [ 20°W ; 19.2°W [ |
| ] 18.8°W ; 18°W ] |
| [ 14°W ; 13.2°W [ |
| ] 12.8°W ; 12°W ] |
| [ 8°W ; 7.2°W [ |
| ] 6.8°W ; 6°W ] |
| [ 2°W ; 1.2°W [ |
| ] 0.8°W ; 0°E ]  |
| [ 4°E ; 4.8°E [ |
| ] 5.2°E ; 6°E ] |

Working Party 4A (WP 4A) is the responsible group for the studies on agenda item 1.4. During its meeting on 28 September – 6 October 2016, Geneva WP 4A created the skeleton of Working Document towards a Preliminary Draft New Report (PDNR) ITU-R BO.[AP30.ANNEX7]. The CEPT Brief uses the same structure and nomenclature of limitations in order to facilitate its understanding.

During the same meeting, it was also agreed that BSS not subject to RR Appendix 30 (12.5-12.7 GHz), in Region 3, is not the subject of consideration in accordance with Resolution 557 (WRC-15). Until last WP 4A meeting (October 2017), several studies have been carried out for the different limitations. The summary and the conclusion of these studies on limitations can be found in the Working Document towards a Preliminary Draft New Report (PDNR) ITU-R BO.[AP30.ANNEX7].

CEPT considers that limitations A1, A2a, A2b and A2c were developed long time ago to facilitate sharing between Regions, taking into account the state of the Art at that date. Since the adoption of such limitations, technologies were really improved and it’s more and more convenient to find the same satellite operating full or part of the 11.7-12.7 GHz band simultaneously on different Regions. In addition, regulatory sharing criteria to protect all services in the frequency band 11.7-12.7 GHz in all Regions are in place and are fully applicable, if WRC-19 decides to delete Limitations A1, A2a, A2b and A2c. Furthermore, in cases A1 (part a), A2a and A2b, simultaneous operations on same frequency band benefit from the geographical separation that exists between the Regions where these limitations apply. In case A2c further analysis is required to confirm the deletion. Section 3 of Annex 7 defines orbital position limitations (A3 part a), e.i.r.p. limitations (A3 part b) and pfd limitations (A3 part c), in the orbital arc 37.2°W – 10°E in the band 11.7-12.2 GHz, identified as Limitations A3 in Table 1. These limitations were developed to preserve access to the geostationary-satellite orbit by the Region 2 fixed-satellite service in the band 11.7-12.2 GHz, and have resulted in a stable regulatory regime with implications on assignments in the Plan and the List.

CEPT recognises that in considering the modification or deletion of Limitations A3 (part A), implemented satellite networks including those having antenna sizes smaller than 60cm in orbital positions listed in Table 2 must be protected. After different contributions presented during CPG PTB meetings and considering some WP 4A contributions, CEPT decided to propose the following protection method:

Retention of only some of the allowable portions of A3 (part A) limitation as proposed in section 3.4, with the aim to protect those orbital locations where there are nowadays (as per BRIFIC 2858 database) submitted and implemented satellite networks with antenna sizes smaller than 60 cm. In case new satellite networks with antenna size lower than 60 cm are implemented before the end of WRC-19, the proposal included in section 3.4 will be reviewed accordingly.

In conclusion, CEPT has decided to support the deletion of Limitations A1 (part a), A1 (part b), A2a, A2b, A3 (part b) and A3 (part c) and the modification of Limitation A3 (part a) to protect existing BSS networks with antenna size lower than 60 cm in the arc 37.2°W-10°E which will permit a better utilisation of the orbit spectrum resource without creating undue constraints to all services in the band 11.7-12.7 GHz in all Regions. For A2c limitation, CEPT is still considering the possible deletion of the limitation.

Also, additional studies are necessary to decide which satellite networks, with antenna sizes smaller than 60 cm, must be protected: e.g. only the satellite networks implemented before last day of WRC-19. The term “implemented” in this case has to be understood as referred to those satellite networks that have submitted a part B and have been brought into use.

## Possible operations with current Table 1 of Annex 7 for specific Cases

As can be seen above, Table 2 contains orbital intervals where proposed new or modified assignments in the List are allowed. Taking into account the orbital limitations referred to above, and considering an example where a pair of assignments has a geocentric separation according to Table 2, it could be possible under the current regulatory framework to implement smaller antenna sizes than the standard 0.60 m antenna size for some specific cases. For such specific cases, additional studies should be conducted to possibly identify, if such specific protection level is required. In Figure 1 below, the off-axis antenna gains (following Recommendation ITU-R BO.1213 on reference pattern) of antennas with size of 0.60 m, 0.55 m, 0.50 m, 0.45 m and 0.40 m are plotted vs geocentric orbital separation (frequency 11.7 GHz and efficiency of 65%).

 

Figure 1: Off-axis antenna gain of antenna dimensions from 0.60 m to 0.40 m vs geocentric orbital separation

As can be seen in Figure 1 above, the off-axis antenna gain for antennas with diameter below 0.60 m is the same as for a 0.60 m antenna for orbital separation greater than 4.1˚ for 0.55 m antenna up to 5.5° for 0.40 m antenna.

## Potential impact to assignments in the List within the allowable portions of Table 1 to Annex 7 of RR Appendix 30

The second WP 4A meeting of 2016 received a contribution (document [4A/145](https://www.itu.int/md/meetingdoc.asp?lang=en&parent=R15-WP4A-C-0145)) that examined the potential impact to assignments in the List within the allowable portions of Table 1 to Annex 7 of Appendix 30 with earth stations having antenna size of 0.40 m for the scenario when Table 1 to Annex 7 would be removed.

Table 4 below contains a summary of document 4A/145 on the potential additional interference from two adjacent satellites that an incumbent is forced to accept, for each possible slots in Table 1 of Annex 7 of RR Appendix 30 for a network operating with earth stations with antenna size 40 cm, if current orbit limitations in Annex 7 are removed without additional specific measures.

Table 4: Summary of analysis of potential impact to assignments in the Plan and the List\* within the allowable portions of Table 1 to Annex 7 of RR Appendix 30 for earth stations
with antenna size 40 cm

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Orbital arc | 37.2°W to 36°W | 33.5°W to 32.5°W | 30°W to 29°W | 26°W to 24°W | 20°W to 18°W | 14°W to 12°W | 8°W to 6°W | 4°W | 2°W to 0°E | 4°E to 6°E | 9°E |
| Additional interference towards Sat. A (dB) | Up to 4.14 dB | Up to 0.79 dB | Up to 1.1 dB | Up to 2.4 dB | Up to 5.35 dB | Up to 5.35 dB | Up to 7.85 dB | 0 dB | Up to 7.85 dB | Up to 5.67 dB | 0 dB |

\* - At BRIFIC 2836 there is 1 assignment in the Plan (30W) and 5 assignments in the List (33.5ºW, 30ºW, 4.8ºE) having antennas smaller than 60 cm. All mentioned assignments have antenna size 45 cm, except the one in 4.8ºE having antennas of 40 cm.

The analysis demonstrates an increase up to 7.85 dB of the interference level received by an earth station with antenna size of 40 cm that an incumbent is forced to accept in case WRC-19 would decide to remove the Annex 7 limitation A3a (section A3 of Annex 7 of RR Appendix 30) if no additional specific measures would be considered. This result was obtained considering only 2 interfering satellites, and it is recognised that the interference will be higher if more than 2 interfering satellites are to be considered.

As the additional interference levels considered in this study would be the maximum levels allowable according to pfd mask of section 1 of Annex 1 of RR Appendix 30, administrations would have to accept these interference and their wanted networks would need to be designed to accept these levels of interference.

Therefore, there is a risk that an existing satellite network implementing earth stations with antenna size of 40 cm under the current regulatory regime defined by current orbit limitations in Annex 7, will not be able to continue its operation due to the additional level of interference that an incumbent is forced to accept, unless no additional specific measures are considered. Such situation would be in contradiction to recognizing b) of Resolution 557 (WRC-15), stating: “BSS networks implemented in accordance with the current provisions of Annex 7 to Appendix 30 shall continue to be protected”.

In conclusion, additional specific measures are needed in order not to impose additional constraints on implemented BSS networks if Annex 7 limitation A3a is revised by WRC-19.

## satellite networks of Region 1&3 BSS AP30 located within the allowable portions of Table 1 of Annex 7 of RR Appendix 30 for which has implemented or planning to implement assignments with antenna sizes smaller than 0.60 m

As of SPS database of BRIFIC 2858, there are 6 satellite network filings submitted with antenna sizes smaller than 0.6 m, in 3 different orbital locations (33.5ºW, 30ºW and 4.8ºE). As of September 2017, two of them are implemented at 30ºW (with antenna size of 45 cm) and 4.8ºE (with antenna size of 40 cm).

## portions of Table 1 of Annex 7 to Appendix 30 that would protect the current submitted assignments (as of brific 2858) with antenna sizes smaller than 0.60 m

Considering results of section 3.1 and the contribution to WP 4A (Doc [4A/442](https://www.itu.int/md/R15-WP4A-C-0442/en)), wanted networks with an antenna size lower than 60 cm could suffer from an excess of interference compared to the level of allowed interference from a network in compliance with Annex 1 pfd mask, if the orbital separation of such interferer network with the wanted network is from ~2° to 5.5° for an antenna size of 40 cm and from ~2° to 5° for an antenna size of 45 cm.

Therefore, the proposed Table 5 would ensure the protection of satellite networks notified and BIU with antenna size lower than 60 cm within the orbital arc 37.2°W-10°E.

In case new satellite networks are implemented before the end of WRC-19 this proposal concerning not allowable orbital positions will be reviewed accordingly.

Table 5: Allowable portions of the orbital arc between 37.2° W and 10°E for assignments in the Regions 1 & 3 Plan and List

|  |
| --- |
| Allowable orbital position |
| 37.2°Wto35°W | 33.5°Wto32.5°W | 32°Wto28°W | 26°Wto0°E |  |  |  |  |  | 2.8°Eto6.8°E | 9°E |

# List of relevant documents

ITU-Documentation:

* Recommendation ITU-R BO.1697, “Power flux-density values in the band 11.7‑12.7 GHz and associated calculation methodology which may be used for bilateral coordination when the power flux-density values in § 3 of Annex 1 to Appendix 30 or Annex 4 to Appendix 30 of the Radio Regulations are exceeded“, adopted in 2005.
* Report ITU-R BO.809, “Inter-regional sharing of the 11.7 to 12.75 GHz frequency band between the broadcasting-satellite service and the fixed-satellite service“, adopted in 1990.
* Doc. 4A/519, Annex 095 Working document towards a Preliminary Draft Report ITU-R BO.[AP30.ANNEX7] “Assessment on limitations mentioned in Annex 7 to RR Appendix 30 (Rev.WRC-12) in the 11.7-12.7 GHz band for the GSO broadcasting-satellite service in all Regions”.
* Doc. 4A/519 Annex 27 - Preliminary draft CPM text for WRC-19 Agenda item 1.4.

CEPT and/or ECC Documentation:

* ERC Decision ERC/DEC/(00)08 of 19 October 2000 on the use of the band 10.7-12.5 GHz by the fixed service and Earth stations of the broadcasting-satellite and fixed-satellite Service (space-to-Earth).

EU Documentation (Directives, Decisions, Recommendations, other), if applicable

# Actions to be taken

To prepare proposals to preliminary draft new Report ITU-R BO.[AP30.ANNEX7], if necessary

To prepare proposals to the draft CPM Report

To prepare proposals to ECP

To consider, taking into account the date of the Part A submission and the date of implementation, which satellite networks with antenna sizes smaller than 60 cm must be protected if any modification to Limitation A3 is made.

To decide, in case limitations are deleted, from which the date Administrations will be allowed to submit new satellite networks without the limitations restrictions.

# Relevant information from outside CEPT (examples of these are below)

## European Union (date of proposal)

## Regional telecommunication organisations

APT (July 2017)

APT members support ITU-R studies and are of the view that any possible revision of the limitations of Annex 7 to Radio Regulations Appendix 30 (Rev.WRC-15) under Resolution 557 (WRC-15) should not impose any constraints on all assignments for Appendix 30 for Region 3.

ATU (September 2017)

The APM19-2 agreed to:

1. Support the study of each limitation under Annex 7 to Appendix 30; studies of which these studies seek to explore ways of allowing better utilization of the orbit spectrum resource without creating undue constraints to all services in the band 11.7-12.7 GHz in all Regions.

2. Note that removal of these limitations should be associated with some implications on other networks currently in operation and registered successfully either in the PLAN or LIST but not implemented in some cases.

3. Note that removal of these limitations may allow new networks to be registered which may increase or create burdens for coordination of new assignment.

4. Note that the principle of the Planned bands is to allow equitable access to the spectrum and associated orbital resources, removal of these limitations will add new orbital locations and frequency assignment, these resources must be allotted to member states first which may require further studies that is not in the scope in the agenda item, and therefore removal of these limitations may deviate the current principle of the Plan.

5. Note that based on the above, some administrations noticed that No change method is not included in the current draft CPM text, and therefore these administrations are in the view that No change method to satisfy this agenda item may reflect concerns mentioned above.

6. Mandate the proponents of the “No Change” option to develop a document and submit the same as an African common proposal for consideration by the ITU Working Party 4A meeting in October 2017. It was agreed that the developed document shall be subjected to approval by ATU member states through circulation. This input document should carefully justify the proposal for explicit inclusion of the NOC option as part of the methods considering that by default NOC is a method for each agenda item.

Arab Group (April 2017)

Follow-up studies.

Not supporting the removal of any restrictions that may have a potential impact on the current allocations or allotments of the plan.

Protection of assignments included in the Plan and List and the future of BSS networks.

CITEL (December 2017)

Preliminary Views

CAN, USA:

With respect to Agenda Item 1.4, the United States and Canada support the studies in accordance with Resolution 557 (WRC-15).  Based upon successful conclusion of these activities, the United States and Canada support the review and revision, as necessary, of the limitations of Annex 7 to Appendix 30 (Rev.WRC‑12), while ensuring the protection of existing assignments in the Plan and the List and the future development of BSS service within the Plan, and existing and planned fixed-satellite service networks.

RCC (September 2017)

The RCC Administrations support studies on possible revisions to the limitations in Annex 7 to Appendix 30 (Rev. WRC-12), while ensuring the protection of, and without imposing additional constraints on, BSS assignments in the Plan and in the List and FSS networks.

The RCC Administrations support the deletion of the following limitations

Atlantic Region:

* Limitation A1 (part a) (No assignments in the Region 1 List in the frequency band 11.7‑12.2 GHz further west than 37.2°W);
* Limitation A2a (No modification in the Region 2 Plan in the frequency band 12.5‑12.7 GHz further east than 54°W);
* Limitation A2b (No modification in the Region 2 Plan in the frequency band 12.2‑12.5 GHz further east than 44°W).

Pacific Region:

* Limitation A1 (part b) (No assignments in the Region 1 List in the frequency band 11.7‑12.2 GHz further east than 146°E);

The RCC Administrations consider the possibility to delete the following limitation

Pacific Region:

* Limitation A2c (No modification in the Region 2 Plan in the frequency band 12.2‑12.7 GHz further west than 175.2°W).

The RCC Administrations continue studies on suppression/revision of the following limitations:

* Limitation A3 (part a) (No assignments in the Regions 1 & 3 List outside specific allowable portions of the orbital arc between 37.2°W and 10°E);
* Limitation 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);
* Limitation A3 (part c) (Max. power flux density of -138 dB(W/(m2·27 MHz)) at any point in Region 2 by assignments in List located at 4°W and 9°E);
* Limitation B (Required agreement of administrations having assignments to space stations in the same cluster when an administration may locate a satellite within this cluster).

The RCC Administrations consider that the proposed revisions of criteria and provisions of Appendix 30 (Rev. WRC-15), other than of Annex 7, are beyond the scope of the studies in accordance with Resolution 557 (WRC-15).

## International organisations

IATA (date of proposal)

ICAO (date of proposal)

IMO (date of proposal)

SFCG (date of proposal)

WMO and EUMETNET (date of proposal)

## Regional organisations

ESA (date of proposal)

Eurocontrol (date of proposal)

## OTHER INTERNATIONAL AND REGIONAL ORGANISATIONS

EBU (date of proposal)

GSMA (date of proposal)

CRAF (December 2016)

The frequency bands under consideration are sufficiently far away from RAS allocations and the revision of Annex 7 to Appendix 30 will not concern CRAF.