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|  |  Doc. CPG(18)073 ANNEX IV-04 |
| CPG19-7 |
| Hilversum, Netherlands, 27th - 30th November 2018 |
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| Date issued:  | 30th November 2018 |
| Source:  | Minutes CPG19-7 |
| Subject:  | Draft CEPT Brief on WRC-19 Agenda Item 1.4 |
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| Summary:  |
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| Proposal:  |
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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 does not support method A (No Change) of the draft CPM text.

CEPT still continues discussing methods B and C, that only differ on the limitations A1a and A2a. The preliminary CEPT position, limitation by limitation is:

CEPT supports the deletions of the limitations:

* Limitation A1a (No assignments in the Region 1 List further west than 37.2°W)
* Limitation A2a (No modification in the Region 2 Plan further east than 54°W)

CEPT is still considering whether these limitations can be suppressed without any additional regulatory measure (method B of draft CPM text) or if new additional measures, including a new resolution to not limit future deployment of Region 1 and Region 2 FSS with respect to new BSS assignments (method C of draft CPM text), are necessary.

CEPT also supports the deletions of the limitations:

* Limitation A2b (No modification in the Region 2 Plan further east than 44°W)
* Limitation A3b (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 A3c (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)
* Limitation A3a (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)

Regarding the A3a limitation, CEPT considers that 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), must be guaranteed. To achieve it, CEPT supports the solution which proposes that in the examination to determine if these implemented satellite networks will be affected by new Region 1 and 3 BSS satellite networks from some specific orbital locations, only the EPM criteria will be applied and the PFD mask criteria will not be considered. This solution implies the deletion of this limitation and the incorporation of a new resolution.

CEPT supports the retentions of the limitations:

* Limitation A2c (No modification in the Region 2 Plan further west than 175.2°W)
* Limitation A1b (No assignments in the Region 1 List further east than 146°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.

In addition, after the removal of the relevant limitations described above, CEPT supports the application of a new Resolution that would give 90 days priority to submit new satellite networks to those Administrations with national assignments in the Regions 1 and 3 Plan with equivalent downlink protection margin values equal or below -10 dB.

CEPT supports to apply as of 23 November 2019 the modifications to Annex 7 of Appendix 30, to this effect, a revision of Article 59 and a draft new Resolution are proposed.

# 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 |
| A1a | 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) |
| A1b | 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 |
| A3a | 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) |
| A3b | 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 (see Table 3) |
| A3c | 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 (February 2018), 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]. WP 4A has also made a lot of progress in the development of the draft CPM text which considers several different methods depending on the different specific limitations.

CEPT considers that limitations A1 and A2 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 have really improved and it is more and more common 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. In cases A1a, A2a and A2b are deleted, simultaneous operations on same frequency band benefit from the geographical separation that exists between the Regions where these limitations apply (i.e. Atlantic Ocean). However, in the case of A1b and A2c, the deletion of such limitations is not feasible due to the limited geographical separation between land masses in Regions 1 and 2 (i.e. Chukotka and Alaska). Section 3 of Annex 7 defines orbital position limitations (A3a), e.i.r.p. limitations (A3b) and pfd limitations (A3c), 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.

When considering A1a and A2a limitations, CEPT supports their deletion. Two options are being considered on how to implement the deletion:

* Deletion of both Limitations A1a and A2a without additional regulatory measures, in line with method B of the draft CPM text.
* Deletion of both Limitations A1a and A2a with additional measures included in a new resolution to not limit the future deployment of Region 1 and Region 2 FSS networks, in line with method C of the draft CPM text. This new resolution proposes to apply the same pfd coordination thresholds as contained in Annex 4 to Appendix 30, with the difference that for future Region 2 and Region 1 FSS networks with respect to future Region 1 and Region 2 BSS frequency assignments filed further west of 37.2°W or further east of 54°W, the pfd will be calculated only on the BSS network’s test points instead of the complete service area.

CEPT recognises that in considering the modification or deletion of Limitation A3a, implemented satellite networks including those having antenna sizes smaller than 60 cm 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 supports to delete the paragraph that refers to this limitation in Annex 7 to Appendix 30 of RR and to incorporate a new Resolution. This Resolution proposes an alternative method to determine whether implemented satellite networks with antenna sizes smaller than 60 cm are affected by new satellite networks located in some specific orbital locations (see section 3.2). More specifically, it proposes that in the examination performed by the Bureau, the PFD mask criteria will not be taken into account and only the EPM criteria will be considered. This solution avoids the use of the existing PFD mask criteria, that was not designed to protect antennas smaller than 60 cm and ensures the protection of implemented satellite networks including them. CEPT recognises that if orbital limitations in Annex 7 to Appendix 30 are removed, a period of 90 days with priority should be given to those Administrations in Regions 1 and 3 which do not have networks in the Region 1 and 3 List and have their national assignments degraded, to submit new assignments in the newly allowed orbital arcs. This procedure would be implemented with a new resolution, the period of priority proposed is 90 days and the coverage of the new networks would be limited to the national territory.

CEPT, in line with WP 4A, has agreed, in the context of Agenda Item 1.4, on the following definition of “implemented” networks:

For the avoidance of doubt, the “implemented” networks referred to in this document are related to Regions 1 & 3 BSS networks in the orbital arc 37.2°W and 10°E:

* for which complete RR Appendix 4 information had been received by the Bureau under § 4.1.3 of RR Appendix 30 prior to 28 November 2015; and
* for which complete RR Appendix 4 information had been received by the Bureau under § 4.1.12 of RR 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 RR Appendix 4 information had been received by the Bureau under § 5.1.2 of RR Appendix 30 prior to 23 November 2019; and
* brought into use, and for which the date of bringing into use has been confirmed to the Bureau before 23 November 2019.

In conclusion, CEPT has decided to support the deletion of Limitations A1a, A2a, A2b, A3b and A3c and the deletion of Limitation A3a, developing a new Resolution to protect implemented BSS networks with antenna size lower than 60 cm (45 cm and 40 cm) in the arc 37.2°W-10°E.These changes 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 A1b and A2c limitations, CEPT supports the retention of them. Regarding B limitation CEPT is of the view that decisions over this limitation are out of the scope of CEPT. If after the WRC-19, as a consequence of the removal or modification of these limitations, new orbital arcs are newly allowed for new Ap30 satellite networks, CEPT supports to develop a new Resolution to give 90 days of priority to submit new satellite networks with coverage limited to the national territory, to those Administrations which have their national assignments really degraded. Considering the importance of this draft new Resolution to help administrations to improve equitable access to satellite orbit resources by providing priority to Administrations with a degraded reference situation, CEPT supports to apply as of 23 November 2019 the modifications to Annex 7 of Appendix 30. To this effect, a revision of Article 59 and a draft new Resolution are proposed.

## 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 orbital positions. For such specific orbital positions, 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 (The implemented antennas smaller than 60cm only contemplate 40 cm and 45 cm)

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 4.9˚ for 0.45 m antenna up to 5.5° for 0.40 m antenna.

Therefore, there is a risk that an implemented satellite network using earth stations with antenna size of 40 cm and 45 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.

## IMPLEMENTED Satellite networks with antennas smaller than 60 CM AND ORBITAL LOCATIONS WHERE THE SOLUTION PROPOSED FOR LIMITAION A3A WOULD APPLY

The table below specifies the implemented satellite networks, according to the definition above, with antennas smaller than 60 cm that will be protected (first 5 columns). The last column specifies, for each of these networks, the arc segments where the solution proposes for A3a limitation will be applied.

Table 4: Implemented satellite networks with antennas smaller than 60cm and the orbital arc segments where the solution proposed for A3a limitation applies

|  |  |
| --- | --- |
| Implemented satellite networks with antennas smaller than 60cm | Orbital arc segments where the solution proposed for A3a limitation applies |
| Orbital position | Earth station antenna size, cm | Satellite Network | Date of Receipt of Part A submission | Notice Id Part II |
| 33.5ºW | 45 | UKDIGISAT-4C | 09.10.2014 | TBD | 36.0ºW < Θ ≤ 35.36ºW;31.64ºW ≤ Θ < 30.0ºW;29.0ºW < Θ ≤ 28.58ºW; |
| 30.0ºW | 45 | HISPASAT-1 | 08.02.2000 | 99500256 | 34.92ºW ≤ Θ < 33.5ºW;32.5ºW < Θ ≤ 31.86ºW;28.14ºW ≤ Θ < 26.0ºW; |
| HISPASAT-37A | 19.11.2014 | 117560019 |
| 4.8ºE | 40 | SIRIUS-N-BSS | 17.11.2014 | 118560003 | 0 < Θ ≤ 2.85ºE;6.75ºE ≤ Θ < 9.0ºE;9ºE < Θ ≤ 10ºE; |

# 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/826, Annex 18 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/826 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 decide which regulatory solution is preferable with regard to limitations A1a and A2a.

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

To prepare proposals to ECP.

To study whether orbit limitation references are required with the deletion of A1a, A2a and A2b limitations in order to define the orbital arc allowed. In case they are, to decide the technical criteria to define them.

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

## European Union (date of proposal)

## Regional telecommunication organisations

APT (June 2018)

APT members are of the view to support ITU-R studies and 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 undue constraints on current and future FSS/BSS usage in the 11.7-12.7 GHz frequency band for Region 3.

ATU (October 2018)

1. Method C, which include the new Resolution [B14-PRIORITY] (WRC-19) which was proposed by African countries to give priority to Administrations with very bad reference situationin the Appendix 30, 30A (below -10 dB) to submit their filings for a period of 90 days, should WRC-19 approve the removal of the limitations.
2. Support, as a matter of principle, the removal of limits in Annex 7 if the countries with very bad reference situation are given first opportunity to improve their allotted satellite networks in Appendix 30.
3. Support the study of each limitation under Annex 7 to Appendix 30; these studies seek to explore ways of allowing better utilization of the orbit spectrum resource.

Arab Group (April 2018)

* Support no change to Annex7 limitations
* Support no change Annex 1 to 4 of Appendix 30 as it is outside the scope of 1.4.

CITEL (June 2018)

CAN, MEX, USA

With respect to Agenda Item 1.4, these Administrations support the studies in accordance with Resolution 557 (WRC-15).  Based upon successful conclusion and feasibility of these activities, these Administrations support the review and revision, as necessary, of the limitations of Annex 7 to Appendix 30 (Rev.WRC‑12), while ensuring the protection of, and without imposing additional constraint on, 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 (October 2018)

The RCC Administrations do not oppose the deletion of the following limitations (Atlantic Region):

* Limitation A1a (No assignments in the Region 1 List further west than 37.2°W)
* 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)

The RCC Administrations support maintaining the following limitation (Pacific Region):

* Limitation A1b (No assignments in the Region 1 List further east than 146°E)

The RCC Administrations do not oppose the deletion of the following limitations

* Limitation A3a (No assignments in the Regions 1 & 3 List outside specific allowable portions of the orbital arc between 37.2°W and 10°E) provided the existing protection criteria from Annex 1 to RR Appendix 30 are maintained for implemented frequency assignments with an antenna diameter of 40 and 45 cm;
* Limitation A3b (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)
* Limitation A3c (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)

The RCC Administrations support maintaining 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 do not oppose maintaining the limitation B associated with the concept of the space stations grouping which the Region 2 Plan is based on.

In case of deletion of appropriate limitations, the RCC Administrations support the application of the specific procedure (see AI 1.4, CPM Report Chapter 3) during a limited period of time within which the priority right to submit applications for new orbital positions is provided to the administrations of Regions 1 & 3, national assignments of which have a negative equivalent protection margin on the downlink.

The RCC Administrations consider that the proposals on 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 (date of proposal)