World Radiocommunication Conference (WRC-23)
Dubai, 20 November - 15 December 2023

PLENARY MEETING

Addendum 12 to Document 6234(Add.22)-E
9 October 2023
Original: English

African Common Proposals

PROPOSALS FOR THE WORK OF THE CONFERENCE

Agenda item 7(J)

7 to consider possible changes, in response to Resolution 86 (Rev. Marrakesh, 2002) of the Plenipotentiary Conference, on 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 the rational, efficient and economical use of radio frequencies and any associated orbits, including the geostationary-satellite orbit;

7(J) Topic J - Modifications to Resolution **76 (Rev.WRC-15)**

MOD AFCP/6234A22A12/1

RESOLUTION 76 (REV.WRC-~~15~~23)

Protection of geostationary fixed-satellite service and geostationary broadcasting-satellite service networks from the maximum aggregate equivalent power flux-density produced by multiple non-geostationary fixed-satellite service systems in frequency bands where equivalent power flux-density limits have been adopted

The World Radiocommunication Conference (~~Geneva, 2015~~Dubai, 2023),

considering

a) that WRC-97 adopted, in Article **22**, provisional equivalent power flux-density (epfd) limits to be met by non-geostationary fixed-satellite service (non-GSO FSS) systems in order to protect GSO FSS and GSO broadcasting-satellite service (BSS) networks in parts of the frequency range 10.7-30 GHz;

b) that WRC-2000 revised Article **22** to ensure the limits contained therein provide adequate protection to GSO systems without placing undue constraints on any of the systems and services sharing these frequency bands;

c) that WRC-2000 decided that a combination of single-entry validation, single-entry operational and, for certain antenna sizes, single-entry additional operational epfd limits, contained in Article **22**, along with the aggregate limits in Tables 1A to 1D as contained in Annex 1 to this Resolution, which apply to non-GSO FSS systems, protects GSO networks in these frequency bands;

d) that these single-entry validation limits have been derived from aggregate epfd masks contained in Tables 1A to 1D of Annex 1, assuming a maximum effective number of non-GSO FSS systems of 3.5;

e) that the aggregate interference caused by all co-frequency non-GSO FSS systems in these frequency bands into GSO FSS systems should not exceed the aggregate epfd limits~~levels~~ in Tables 1A to 1D of Annex 1;

f) that to achieve the objective in *considering e)*, administrations operating non-GSO FSS systems would need to establish in collaboration, through consultation meetings, the evaluation of aggregate interference levels of all concerned space stations and the implementation of measures to ensure that those non-GSO FSS space stations do not exceed the aggregate epfd limits for the protection of GSO FSS networks;

~~*f*~~*g)* that WRC-97 decided, and WRC-2000 confirmed, that non-GSO FSS systems in the frequency bands in question are to mutually coordinate the use of frequencies in these frequency bands under the provisions of No. **9.12**;

~~*g*~~*h)* that the orbital characteristics of such systems are likely to be inhomogeneous;

~~*h*~~*i)* that, as a result of this likely inhomogeneity, the aggregate epfd levels from multiple non-GSO FSS systems will not be directly related to the actual number of systems sharing a frequency band~~, and the number of such systems operating co-frequency is likely to be small~~;

~~*i*~~*j)* that the possible misapplication of single-entry limits should be avoided,

recognizing

a) that non-GSO FSS systems ~~are likely to~~may need to implement interference mitigation techniques to mutually share frequencies;

~~*b)* that, on account of the use of such interference mitigation techniques, it is likely that the number of non-GSO systems will remain small, as will the aggregate interference caused by non-GSO FSS systems into GSO systems;~~

Reason for deletion: speculating on whether the number of non-GSO systems will remain small may not be appropriate.

~~*c*~~*b)* that, notwithstanding *considering d)* and *e)* ~~and *recognizing b)*~~, there may be instances where the aggregate interference from non-GSO systems could exceed the interference levels given in Tables 1A to 1D of Annex 1;

~~*d*~~*c)* that administrations operating GSO systems may wish to ensure that the aggregate epfd produced by all operating co-frequency non-GSO FSS systems in the frequency bands referred to in *considering a)* above into GSO FSS and/or GSO BSS networks does not exceed the aggregate interference levels given in Tables 1A to 1D of Annex 1~~,~~;

d) that there is no suitable methodology for calculating the aggregate epfd produced by non-GSO FSS systems that meet the applicable criteria indicated in Annex 2 operating co-frequency in the frequency bands referred to in *considering a)* above into GSO FSS and GSO BSS networks;

e) that there is no existing methodology to adapt the operation of all non-GSO FSS systems that meet the applicable criteria indicated in Annex 2 operating co-frequency in the frequency bands referred to in *considering a)* above to ensure that the aggregate epfd limits given in Tables 1A to 1D of Annex 1 are met;

Note: In order to comply with the provisions of *resolves* 2, two methodologies are under development to calculate the aggregate epfd produced by all non-GSO systems and to adapt the operations of all non-GSO systems when applicable criteria are exceeded;

f) that, until the methodology mentioned in *recognizing d)* above is available, in the event that an administration operating a GSO FSS network identifies epfd from non-GSO FSS systems in excess of the aggregate limits in Tables 1A to 1D, this administration can immediately apply the provisions of No. **22.5K** to request administrations operating those non-GSO FSS systems to take all necessary measures expeditiously to reduce the aggregate epfd levels to the limits given in Tables 1A to 1D, or to higher levels where those levels are acceptable to the affected GSO administration(s);

g) that any administration may attend those consultation meetings as observers,

noting

Recommendation ITU-R S.1588 “Methodologies for calculating aggregate downlink equivalent power flux-density produced by multiple non-geostationary fixed-satellite service systems into a geostationary fixed-satellite service network”,

resolves

1 that administrations operating or planning to operate non-GSO FSS systems, for which coordination or notification information, as appropriate, was received after 21 November 1997, in the frequency bands referred to in *considering a)* above, individually or in collaboration, shall take all possible steps, including, if necessary, by means of appropriate modifications to their systems, to ensure that the aggregate interference into GSO FSS and GSO BSS networks caused by such

systems operating co-frequency in these frequency bands does not cause the aggregate power levels given in Tables 1A to 1D of Annex 1 to be exceeded (see No. **22.5K**);

2 that, in the event that the aggregate interference levels in Tables 1A to 1D of Annex 1 are exceeded, administrations operating non-GSO FSS systems complying with the applicable criteria indicated in Annex 2 in these frequency bands shall take all necessary measures expeditiously to reduce the aggregate epfd levels to the limits~~those~~ given in Tables 1A to 1D of Annex 1, or to higher levels where those levels are acceptable to the affected GSO administration (see No. **22.5K**)~~,~~;

3 that administrations, when evaluating aggregate power levels under *resolves* 1 and 2 above, shall take into account all those satellites included in the relevant information communicated to the Bureau under the applicable provisions of Resolution **35 (WRC-19)** submitted by administrations operating non-GSO FSS systems complying with the applicable criteria indicated in Annex 2 in the frequency bands covered in Tables 1A to 1D of Annex 1 along with the relevant information provided to the consultation meetings referred to in *considering f)*;

3*bis* that, in order to identify the non-GSO systems mentioned in *resolves* 3 above, the criteria listed in Annex 2 shall be used;

4 that administrations engaged in consultation meetings, in developing agreements to carry out their obligations under *resolves* 1 and 2 above, shall establish mechanisms to ensure that all administrations are given full visibility of the process;

Option 1:

5 that, since the limits of Tables 1A to 1D of Annex 1 were based on the assumption that 3.5 non-GSO FSS systems would operate simultaneously, once at least [4] non-GSO systems in each of the frequency bands indicated in Tables 1A to 1D of Annex 1 satisfy the applicable criteria included in Annex 2, the concerned administrations participating in this process of epfd calculation should hold consultation meetings as needed, but not earlier than when the methodologies mentioned in *invites the ITU Radiocommunication Sector* 1 and 2 are approved and made available to the membership;

Option 2:

5 that, since the limits of Tables 1A to 1D of Annex 1 were based on the assumption that 3.5 non-GSO FSS systems would operate simultaneously, once at least [4] non-GSO systems in each of the frequency bands indicated in Tables 1A to 1D of Annex 1 satisfy the applicable criteria included in Annex 2, the concerned administrations participating in this process of epfd calculation should hold consultation meetings as needed, but not earlier than when the methodology mentioned in *invites the ITU Radiocommunication Sector* 1 are approved and made available to the membership;

Note: Views were expressed that if such methodology developed by a limited number of countries during consultation meetings is not included into the Radio Regulation, administrations are not bound by this methodology.

5*bis* that administrations notifying GSO networks that meet the applicable criteria indicated in Annex 2 and operating in the frequency bands indicated in Tables 1A to 1D of Annex 1 can participate in the process mentioned in *resolves* 5 above and make comments with respect to the results of the computations;

5*ter* that the Terms of Reference included in Annex 3 shall be used to regulate the first consultation meeting mentioned in *resolves* 5 above;

6 that those administrations participating in the consultation meeting shall designate one administration that shall communicate to the Bureau the results of any technical or operational amendment to the relevant non-GSO FSS systems following the application of *resolves* 2 above;

7 that any amendment to the relevant non-GSO FSS systems mentioned in *resolves* 6 shall not affect the regulatory status of the affected non-GSO systems, including following any modifications to their published characteristics,

invites the ITU Radiocommunication Sector

1 to continue its studies and to develop, as appropriate and as a matter of urgency, a suitable methodology for calculating the aggregate epfd produced by all non-GSO FSS systems that meet the applicable criteria indicated in Annex 2 operating ~~or planning to operate~~ co-frequency in the frequency bands referred to in *considering a)* above into GSO FSS and GSO BSS networks, which may be used to determine whether the systems are in compliance with the aggregate power levels given in Tables 1A to 1D of Annex 1, taking into account relevant elements of Recommendation ITU-R S.1588 and Recommendation ITU-R S.1503, as appropriate;

2 to develop, as a matter of urgency, a suitable methodology to adapt the operation of all non-GSO FSS systems that meet the applicable criteria indicated in Annex 2 operating co-frequency in the frequency bands referred to in *considering a)* above to ensure that the aggregate power levels given in Tables 1A to 1D of Annex 1 are met,

~~2 to continue its studies and to develop a Recommendation on the accurate modelling of interference from non-GSO FSS systems into GSO FSS and GSO BSS networks in the frequency bands referred to in *considering a)* above, in order to assist administrations planning or operating non-GSO FSS systems in their efforts to limit the aggregate epfd levels produced by their systems into GSO networks, and to provide guidance to GSO network designers on the maximum epfd↓ levels expected to be produced by all non-GSO FSS systems when accurate modelling assumptions are used;~~

~~3 to develop a Recommendation containing procedures to be used among administrations in order to ensure that the aggregate epfd limits given in Tables 1A to 1D are not exceeded by operators of non-GSO FSS systems;~~

~~4 to attempt to develop measurement techniques to identify the interference levels from non-GSO systems in excess of the aggregate limits given in Tables 1A to 1D, and to confirm compliance with these limits,~~

~~*instructs the Director of the Radiocommunication Bureau*~~

~~1 to assist in the development of the methodology referred to in *invites the ITU Radiocommunication Sector* 1 above;~~

~~2 to report to a future competent conference on the results of studies in *invites the ITU Radiocommunication Sector* 1 and 3 above.~~

instructs the Radiocommunication Bureau

1 to participate in consultation meetings mentioned under *resolves* 6 and to observe carefully the results of the epfd calculation mentioned in *resolves* 5;

2 to publish in the International Frequency Information Circular (BR IFIC) the information referred to in *resolves* 6 and *instructs the Radiocommunication Bureau* 1.

ANNEX 1 TO RESOLUTION 76 (REV.WRC-~~15~~23)

…

ANNEX 2 TO RESOLUTION 76 (REV.WRC-23)

Criteria to identify non-GSO systems and GSO networks, as applicable, that shall be taken into account to evaluate the aggregate epfd levels, in compliance with *resolves* 1 and 2

A Criteria for non-GSO systems

1 Submission of appropriate Notification information under No. **11.2** of the Radio Regulations; and

2 Submission of the information referred to in *resolves* 2 or 3, as applicable, of Resolution **35 (WRC-19)**.

Note: These criteria determine which non-GSO systems will be taken into account in the computation of aggregated epfd, but it is worth to mention that only the operational satellites will be used for computation that could lead to application of *resolves* 2.

B Criteria for GSO networks

1 Submission of appropriate Notification information under No. **11.2** of the Radio Regulations; and,

2 Submission of the information referred to in No. **11.44B** of the Radio Regulations.

Note (related to option 2): Taking into account that the aggregate epfd limit are defined to protect all existing and future GSO networks, the necessity to establish criteria for the participation of notifying administration for GSO networks need to be further considered.

ANNEX 3 TO RESOLUTION 76 (REV.WRC-23)

Terms of Reference regulating the first Consultation Meetings taking place in application of *resolves* 5

1 Consultation Meetings between administrations operating non-GSO systems in the fixed-satellite service (FSS) in the frequency bands indicated in Tables 1A to 1D of Annex 1 will be held in accordance with this Resolution. These meetings will ensure that the epfd produced by all non-GSO satellite systems operating does not exceed the relevant limits specified in Annex 1 to this Resolution;

2 The notifying administrations of GSO operators can participate in the Consultation Meetings in compliance with *resolves* 5*bis* and 5*ter* of this Resolution. The Bureau can participate in the Consultation Meetings as observer and shall also carry out the functions assigned to it in the *instructs the Director of the Radiocommunication Bureau* 1 and 2 of this Resolution;

3 For each Consultation Meeting, a convening administration is appointed. The appointment is made at the end of the previous Consultation Meeting and decided by the

administrations of those systems under which the participating non-GSO systems operate. The convening administration is responsible for:

a) organizing the work to be conducted during the Consultation Meeting; and

b) preparing a draft summary record of the Consultation Meeting and a report containing the results, for discussion and approval by the participating administrations with the final report approved and submitted to the Bureau not later than 45 days after the end of the meeting;

4 No later than six (6) months before the Consultation Meeting, the convening administration shall provide participants with practical information about the meeting venue;

5 No later than six (6) months before the Consultation Meeting, the Bureau should provide the participants with a list of non-GSO systems and GSO networks submitted under No. **11.2** of the Radio Regulations and having assignments in the subject frequency bands. The Bureau shall also provide all information required for the application of the methodology mentioned in *invites the ITU Radiocommunication Sector* 1;

6 No later than four (4) months before the Consultation Meeting, taking into account the criteria included in Annex 2 to this Resolution, administrations should indicate which of its non-GSO satellite systems and GSO networks shall be taken into account in the Consultation Meetings. For each of these systems and networks, administrations should provide the following information (a copy of such information shall be sent to the Bureau):

a) ITU satellite name and publication references (IFIC number, IFIC publication date, Special Section references) for each of the non-GSO systems and GSO networks;

b) the technical information for each of the non-GSO satellite systems, as indicated in Annex 4 to this Resolution;

7 Where multiple ITU filings[1] correspond to a single operating non-GSO satellite system, the filings will be treated as a single operating non-GSO satellite system for the purposes of performing aggregate epfd calculations. The notifying administration or administrations involved shall identify the subject filings to the participants;

8 No later than four (4) months before the Consultation Meeting, administrations will submit (after having performed a conformity check on the data to be submitted) all information option 1: on operational parameters of their non-GSO FSS systems needed to compute the single-entry epfd Probability Density Functions (PDF) and Cumulative Density Functions (CDF) to enable the computation of the aggregate epfd using the methodology mentioned in *invites the ITU Radiocommunication Sector* 1 option 2: as per the methodology developed at ITU-R;

9 No later than one (1) month before the Consultation Meeting, administrations should provide (after having performed a conformity check on the data to be submitted) all participants with results, per each non-GSO system, of the single-entry epfd Probability Density Functions (PDF) and Cumulative Density Functions (CDF). Each administration is responsible for the software used to calculate the single-entry epfd PDF and CDF;

10 After receiving the results of § 9 above and before the Consultation Meeting, the convening administration should perform a conformity check to verify the format of the single-entry input data received, in order to ensure that the aggregate epfd based on the methodology mentioned in *invites the ITU Radiocommunication Sector* 1;

---

[1] The term “ITU filing” indicates the CR/C and/or Notification publications relative to a non-GSO satellite system, as applicable, included in the BR International Frequency Information Circular (BR IFIC).

11 Each Consultation Meeting should at least perform:

a) conformity check of the input data received;

b) execution of all the cases of aggregate epfd based on the methodology mentioned in *invites the ITU Radiocommunication Sector* 1;

c) analysis of the results: indication of "Pass" or "Fail" for every convolution;

12 If, following the methodology developed in application of *invites the ITU Radiocommunication Sector* 1, all cases of aggregate epfd verify that the aggregate limits are met, no action is required until the next Consultation Meeting;

Option 1

13 If one or more cases of aggregate epfd do not pass the aggregate epfd limits check, the Consultation Meeting shall apply the methodology developed in application of *invites the ITU Radiocommunication Sector* 2;

Option 2

13 If the aggregate interference based on the methodology in *invites the ITU Radiocommunication Sector* 1 do not pass the aggregate epfd limits check, the Consultation Meeting shall apply the methodology developed in application of *invites the ITU Radiocommunication Sector* 2 if available, or take all necessary measures expeditiously to reduce the aggregate epfd levels to the limits indicated in Annex 1 to this Resolution;

Option 3

13 In case of exceedance of the aggregate limits, the administrations of the participating non-GSO systems shall work together to ensure that the exceedance is removed in a reasonable time after the meeting;

14 By the end of the Consultation Meeting, all aggregate epfd limits indicated in Annex 1 to this Resolution shall be met;

15 At the end of each Consultation Meeting, the convening administration should draft a report that the Bureau shall publish on the ITU website promptly;

16 After the Consultation Meeting report is available, all administrations can provide comments that the Bureau shall publish on the ITU website promptly.

ANNEX 4 TO RESOLUTION 76 (REV.WRC-23)

Information to be provided for each non-GSO satellite system

1 ITU System Name:

2 Technical parameters of the non-GSO system

2.1 Orbital parameters

TBD

2.2 Operational parameters (as required for the application of the methodology included in Recommendation ITU-R S.1503)

- Maximum number of non-GSO satellite beams transmitting/receiving at the same frequency towards the same point;
- Minimum elevation;
- Minimum satellite tracking duration;
- TBD, based on the possible revision of Recommendation ITU-R S.1503.

3 Single-entry epfd results

epfd bin	No. of occurrences	PDF	CDF
–210			100
–209.9			99.99
–209.8			…
…			