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| A close up of a sign  Description automatically generated | **World Radiocommunication Conference (WRC-23)Dubai, 20 November - 15 December 2023** |  |
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| PLENARY MEETING | **Addendum 9 toDocument 44(Add.22)-E** |
|  | **13 October 2023** |
|  | **Original: English** |
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| Member States of the Inter-American Telecommunication Commission (CITEL) |
| PROPOSALS FOR THE WORK OF THE CONFERENCE |
|  |
| Agenda item 7(G) |

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(G) Topic G - Revisions to Resolution **770 (WRC-19)** to allow its implementation

Background

WRC‑23 agenda item 7 Topic G addresses issues with the implementation of Resolution **770 (WRC-19)** which provides a methodology to determine conformity of non-GSO satellite systems with single-entry interference limits in RR Article **22** to ensure the protection of the GSO fixed-satellite service (FSS) and broadcasting-satellite service (BSS) in the frequency bands 37.5‑39.5 GHz, 39.5‑42.5 GHz, 47.2‑50.2 GHz and 50.4‑51.4 GHz. It has been established that to consistently apply Resolution **770 (WRC-19)**, additional information is required and some existing inconsistency in ITU-R documentation should be addressed.

This Inter-American Proposal is based on Method G3 of the CPM Report for Topic G.

Proposals

MOD IAP/44A22A9/1#2072

RESOLUTION 770 (Rev.WRC‑23)

Application of Article 22 of the Radio Regulations to the protection of geostationary fixed-satellite service and broadcasting-satellite service networks from non-geostationary fixed-satellite service systems in the frequency bands 37.5-39.5 GHz, 39.5‑42.5 GHz, 47.2-50.2 GHz and 50.4-51.4 GHz

The World Radiocommunication Conference (Dubai, 2023),

considering

*a)* that geostationary-satellite (GSO) and non-geostationary-satellite (non-GSO) fixed-satellite service (FSS) networks may operate in the frequency bands 37.5-39.5 GHz (space-to-Earth), 39.5-42.5 GHz (space-to-Earth), 47.2-50.2 GHz (Earth-to-space) and 50.4-51.4 GHz (Earth-to-space);

*b)* that this conference has adopted Nos. **22.5L** and **22.5M**, which contain single-entry and aggregate limits for non-GSO FSS systems in the frequency bands 37.5-39.5 GHz (space-to-Earth), 39.5-42.5 GHz (space-to-Earth), 47.2-50.2 GHz (Earth-to-space) and 50.4-51.4 GHz (Earth-to-space) to protect GSO networks operating in the same frequency bands;

*c)* that the ITU Radiocommunication Sector (ITU‑R) has developed a methodology, contained in Recommendation ITU‑R S.1503, that results in the equivalent power flux-density (epfd) generated by any one non-GSO FSS system considered and a GSO location that corresponds to the worst-case geometry that generates the highest levels of epfd into potentially affected GSO earth stations and satellites,

recognizing

*a)* that, in accordance with calculations utilizing Recommendation ITU‑R S.1503, verification of the worldwide epfd interference of any one non-GSO system can be carried out by a set of generic GSO reference link budgets having characteristics that encompass global GSO network deployments that are independent of any specific geographic locations;

*b)* that Resolution **769 (WRC‑19)** addresses the protection of GSO networks from aggregate emissions from non-GSO systems,

resolves

1 that during the examination under Nos. **9.35** and **11.31**, as applicable, of a non-GSO FSS satellite system with frequency assignments in the frequency bands 37.5-39.5 GHz (space-to-Earth), 39.5-42.5 GHz (space-to-Earth), 47.2-50.2 GHz (Earth-to-space) and 50.4-51.4 GHz (Earth-to-space), the technical characteristics of generic GSO reference links contained in Annex 1 to this Resolution and the methodology in Recommendation ITU‑R S.[QV-METH-REF-LINKS]‑0 shall be used to establish the compliance with No. **22.5L**;

2 that frequency assignments to non-GSO FSS systems referred to in *resolves* 1 shall receive a favourable finding with respect to the single-entry provision given in No. **22.5L** if compliance with No. **22.5L** is established under *resolves* 1, otherwise the assignments shall receive an unfavourable finding;

3 that, if the Radiocommunication Bureau (BR) is unable to examine non-GSO FSS systems subject to the single-entry provision given in No. **22.5L** due to a lack of available software, the notifying administration shall provide all necessary information sufficient to demonstrate compliance with No. **22.5L** and send BR a commitment that the non-GSO FSS system complies with the limits given in No. **22.5L**;

4 that frequency assignments to non-GSO FSS systems that cannot be assessed under *resolves* 1 shall receive a qualified favourable finding under Nos. **9.35** and **11.31** with respect to No. **22.5L** if *resolves* 3 is satisfied, otherwise the assignments shall receive an unfavourable finding;

5 that, if an administration believes that a non-GSO FSS system for which the commitment referred to in *resolves* 3 was sent has the potential to exceed the limits given in No. **22.5L**, it may request additional information from the notifying administration with regard to compliance with these limits and No. **22.2**, and both administrations shall cooperate to resolve any difficulties, with the assistance of BR, if so requested by either of the parties;

6 that *resolves* 3, 4 and 5 shall no longer be applied after BR has communicated to all administrations via a circular letter that validation software is available and BR is able to verify compliance with the limits in No. **22.5L**;

7 that any modification to coordination requests and/or notification information for non‑GSO systems received by the Bureau prior to *15 December 2023 / date of entry into force of this Resolution* for which a qualified favourable finding has been issued with respect to No. **9.35** or No. **11.31** and relating to the information used to derive the probability density function of the epfd computed as per Recommendation ITU‑R S.[QV-METH-REF-LINKS] submitted following *15 December 2023 / the entry into force of this Resolution* as modified by this Conference shall not lead to a change of the date of receipt and/or the date of protection as appropriate,

invites the ITU Radiocommunication Sector

1 to study and, as appropriate, develop a functional description that could be used to develop software for the procedures outlined in *resolves*1 above;

2 to review and, as appropriate, provide updates to the generic GSO reference links in Annex 1 to this Resolution under Resolution **86 (Rev.WRC-07)**,

instructs the Director of the Radiocommunication Bureau

1 to take all necessary measures to facilitate the implementation of this Resolution;

2 to review, once the validation software as described in *resolves*3 is available, BR’s findings made in accordance with Nos. **9.35** and **11.31**.

ANNEX 1 TO RESOLUTION 770 (REV.WRC‑23)

Generic GSO reference links for evaluation of compliance with single-entry requirements for non-GSO systems

The data in this Annex are to be regarded as a generic range of representative technical characteristics of GSO network deployments that are independent of any specific geographic location, to be used only for establishing the interference impact of a non-GSO system into GSO networks and not as a basis for coordination between satellite networks.

Table 1

Parameters of generic GSO reference links to be used in examination of the downlink (space-to-Earth) impact
from any one non-GSO system

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 1 | Generic GSO reference link parameters - service |  |  |  |  | Parameters |
|  | Link type | User #1 | User #2 | User #3 | Gateway |  |
| 1.1 | E.i.r.p. density (dBW/MHz) | 44 | 44 | 40 | 36 | *eirp* |
| 1.2 | Equivalent antenna diameter (m) | 0.45 | 0.6 | 2 | 9 | *Dm* |
| 1.3 | Bandwidth (MHz) | 1 | 1 | 1 | 1 | *BMHz* |
| 1.4 | ES antenna gain pattern | S.1428 | S.1428 | S.1428 | S.1428 |  |
| 1.5 | Additional link losses (dB)This field includes non-precipitation impairments | 3 | 3 | 3 | 3 | *Lo* |
| 1.6 | Additional noise contribution including margin for inter-system interference (dB) | 2 | 2 | 2 | 2 | *M*0*inter* |
| 1.7 | Additional noise contribution including margin for intra-system interference (dB) and non-time varying sources | 1 | 1 | 1 | 1 | *M*0*intra* |

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| --- | --- | --- | --- |
| 2 | Generic GSO reference link parameters - parametric analysis | Parametric cases for evaluation |  |
| 2.1 | E.i.r.p. density variation | −3, 0, **+**3 dB from value in 1.1 | Δ*eirp* |
| 2.2 | Elevation angle (deg) | 20 | 55 | 90 | *ε* |
| 2.3 | Rain height (m) for specified latitude in item 2.4  | 5 000 | 3 950 | 1 650 | 5 000 | 3 950 | 5 000 | *hrain* |
| 2.4 | Latitude\* (deg. *N*) | 0 | ± 30 | ± 61.8 | 0 | ± 30 | 0 | Lat |
| 2.5 | ES noise temperature (K)  | 340 | *T* |
| 2.6 | 0.01% rain rate (mm/hr) | 10, 50, 100 | *R*0.01 |
| 2.7 | Height of ES above mean sea level (m) | 0, 500, 1 000 | *hES* |
| 2.8 | Threshold *C*/*N* (dB) | −2.5, 2.5, 5, 10 |  |
| 2.9 | Probability of non-zero rain attenuation | 10 | *pmax* (%) |
| NOTE – For items 2.2, 2.3 and 2.4, these three groups of data are be considered as unique sets of data to be used in the larger, overall set of total possible permutations. For example, 20 degrees of elevation angle will consider three different latitudes of 0, 30 and 61.8 degrees while 90 degrees of elevation will only consider a latitude of 0 degrees and one possible rain height 5 km. The above parameters are chosen as representative propagation parameters for purposes of calculations of precipitation fade statistics. These precipitation fades are representative of other geographic locations. \* Latitude is evaluated as a single value representing the absolute value of the latitude |

Table 2

Parameters of generic GSO reference links to be used in examination of the uplink (Earth-to-space) impact
from any one non-GSO system

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 1 | Generic GSO reference link parameters - service |  |  |  |  |  |
|   | Link type | Link #1 | Link #2 | Link #3 | Gateway |  |
| 1.1 | ES e.i.r.p. density (dBW/MHz) | 49 | 49 | 49 | 60 | *eirp* |
| 1.2 | Bandwidth (MHz) | 1 | 1 | 1 | 1 | *BMHz* |
| 1.3 | Half-power beamwidth (deg) | 0.2 | 0.3 | 1.5 | 0.3 |  |
| 1.4 | ITU‑R S.672 sidelobe level (dB) | −25 | −25 | −25 | −25 |  |
| 1.5 | Satellite antenna peak gain (dBi) | 58.5 | 54.9 | 38.5 | 54.9 | *Gmax* |
| 1.6 | Additional link losses (dB)This field includes non-precipitation impairments  | 4.5 | 4.5 | 4.5 | 4.5 | *Lo* |
| 1.7 | Additional noise contribution including margin for inter-system interference (dB) | 2 | 2 | 2 | 2 | *M*0*inter* |
| 1.8 | Additional noise contribution including margin for intra-system interference (dB) and non-time varying sources | 1 | 1 | 1 | 1 | *M*0*intra* |

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| --- | --- | --- | --- |
| 2 | Generic GSO reference link parameters - parametric analysis | Parametric cases for evaluation |  |
| 2.1 | E.i.r.p. density variation | −6, 0, +6 dB from value in 1.1 | Δ*eirp* |
| 2.2 | Elevation angle (deg) | 20 | 55 | 90 | *ε* |
| 2.3 | Rain height (m) for specified latitude in item 2.4 | 5 000 | 3 950 | 1 650 | 5 000 | 3 950 | 5 000 | *hrain* |
| 2.4 | Latitude\* (deg. *N*) | 0 | ± 30 | ± 61.8 | 0 | ± 30 | 0 | Lat |
| 2.5 | 0.01% rain rate (mm/hr) | 10, 50, 100 | R0.01 |
| 2.6 | Height of ES above mean sea level (m) | 0, 500, 1 000 | *hES* |
| 2.7 | Satellite noise temperature (K) | 500, 1 600 | *T* |
| 2.8 | Threshold *C*/*N* (dB) | −2.5, 2.5, 5, 10 |  |
| 2.9 | Probability of non-zero rain attenuation | 10 | *pmax* (%) |
| NOTE – For items 2.2, 2.3 and 2.4, these three groups of data are be considered as unique sets of data to be used in the larger, overall set of total possible permutations. For example, 20 degrees of elevation angle will consider three different latitudes of 0, 30 and 61.8 degrees while 90 degrees of elevation will only consider a latitude of 0 degrees and one possible rain height 5 km. The above parameters are chosen as representative propagation parameters for purposes of calculations of precipitation fade statistics. These precipitation fades are representative of other geographic locations. \* Latitude is evaluated as a single value representing the absolute value of the latitude  |

**Reasons:** To facilitate the implementation of Resolution **770** and the maintenance of the associated methodology within the ITU‑R.

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