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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 1 toDocument 65(Add.22)-E** |
|  | **30 October 2023** |
|  | **Original: English** |
|  |
| European Common Proposals |
| Proposals for the work of the conference |
|  |
| Agenda item 7(A) |

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(A) Topic A - Tolerances for certain orbital characteristics of non-GSO space stations in the FSS, BSS or MSS

Introduction

Issue A of agenda item 7 at WRC‑19 considered bringing into use (BIU) of frequency assignments to all non-GSO systems, as well as a milestone-based approach for the deployment of non-GSO systems in specific frequency bands and services. When deciding upon this issue, adopting a new milestone-based approach for the deployment of non-GSO satellite systems in Resolution **35 (WRC‑19)**, WRC‑19 invited ITU‑R to study, “as a matter of urgency, tolerances for certain orbital characteristics of non-GSO space stations of the fixed-satellite, mobile-satellite or broadcasting-satellite services to account for potential differences between the notified and deployed orbital characteristics for the inclination of the orbital plane, the altitude of the apogee of the space station, the altitude of the perigee of the space-station and the argument of the perigee of the orbital plane.”

CEPT proposes to develop a new WRC Resolution which contains the tolerance limits for the altitude and inclination of the non-GSO satellite which shall be used to determine compliance with the notified orbital characteristics of the associated satellite network or system. This Resolution proposes to only apply these tolerances for satellites of non-GSO FSS, BSS or MSS systems subject to Resolution **35** (**WRC‑19**). The Resolution also proposes specific regulatory measures to allow for temporary exceedance of the defined tolerances, for example, for purposes of orbital management, to permit re-organization of satellites in an orbit-plane after a launch of new non-GSO space stations.

This regulatory solution takes the view that space stations that do not respect the orbital tolerances for more than a specific period of time are not compliant with the notified and/or recorded orbital parameters of the associated non-GSO system, shall not cause unacceptable interference and not claim protection and are, accordingly, not compliant with RR Nos. **11.44C**, **11.49.2** and **11.51**.

CEPT proposes a temporary mechanism to adapt the notified orbital parameters with the operational orbital parameters in order to avoid difficulties to systems already in operation or for which coordination request was sent before WRC‑23 and for which the notion of tolerances was not known at the time of their submission.

Proposals

ARTICLE 11

Notification and recording of frequency
assignments1, 2, 3, 4, 5, 6, 7    (WRC‑19)

Section II − Examination of notices and recording of frequency assignments
in the Master Register

MOD EUR/65A22A1/1#1967

11.44C A frequency assignment to a space station in a non-geostationary-satellite orbit network or system in the fixed-satellite service, the mobile-satellite service or the broadcasting-satellite service shall be considered as having been brought into use when a space station with the capability of transmitting or receiving that frequency assignment has been deployed and maintained on one of the notified orbital plane(s)MOD 27 of the non‑geostationary satellite network or system for a continuous period of 90 days, irrespective of the notified number of orbital planes and satellites per orbital plane in the network or system. The notifying administration shall so inform the Bureau within 30 days from the end of the 90‑day period25, 28, 29. On receipt of the information sent under this provision, the Bureau shall make that information available on the ITU website as soon as possible and shall publish it in the BR IFIC subsequently.     (WRC‑23)

MOD EUR/65A22A1/2#1968

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27 11.44C.1 and11.44D.1 For the purposes ofNo. **11.44C** or No. **11.44D**, the term “notified orbital plane” means an orbital plane of the non-geostationary-satellite system, as provided to the Bureau in the most recent notification information for the system’s frequency assignments, that corresponds to Items A.4.b.4.a, A.4.b.4.d, A.4.b.4.e and A.4.b.5.c (only for orbits whose altitudes of the apogee and perigee are different) in Table A of Annex 2 to Appendix **4**. For the purposes of No. **11.44C**, Resolution **[EUR-A7(A)-NGSO-FSS-BSS-MSS**-**Tolerance] (WRC‑23)** also applies for space stations of a non-GSO FSS, BSS or MSS system.     (WRC‑23)

MOD EUR/65A22A1/3#1969

11.49 Wherever the use of a recorded frequency assignment to a space station of a satellite network or to all space stations of a non-geostationary-satellite system is suspended for a period exceeding six months, the notifying administration shall inform the Bureau of the date on which such use was suspended. When the recorded assignment is brought back into use, the notifying administration shall, subject to the provisions of Nos. **11.49.1**, **11.49.2**, **11.49.3** or **11.49.4**, as applicable, so inform the Bureau, as soon as possible. On receipt of the information sent under this provision, the Bureau shall make that information available as soon as possible on the ITU website and shall publish it in the BR IFIC. The date on which the recorded assignment is brought back into use32, 33, 34, 35, MOD 36shall be not later than three years from the date on which the use of the frequency assignment was suspended, provided that the notifying administration informs the Bureau of the suspension within six months from the date on which the use was suspended. If the notifying administration informs the Bureau of the suspension more than six months after the date on which the use of the frequency assignment was suspended, this three-year time period shall be reduced. In this case, the amount by which the three-year period shall be reduced shall be equal to the amount of time that has elapsed between the end of the six-month period and the date that the Bureau is informed of the suspension. If the notifying administration informs the Bureau of the suspension more than 21 months after the date on which the use of the frequency assignment was suspended, the frequency assignment shall be cancelled. Ninety days before the end of the period of suspension, the Bureau shall send a reminder to the notifying administration. If the Bureau does not receive the declaration of the commencement of the bringing back into use period within thirty days following the limit date of the period of suspension established in accordance with this provision, it shall cancel the entry in the Master Register. The Bureau shall, however, inform the administration concerned before taking such action.     (WRC‑23)

MOD EUR/65A22A1/4#1970

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36 11.49.5 For the purposes of Nos. **11.49.2** and **11.49.3**, the term “notified orbital plane” means an orbital plane of the non-geostationary-satellite system, as provided to the Bureau in the most recent notification information for the system’s frequency assignments, that corresponds to Items A.4.b.4.a, A.4.b.4.d, A.4.b.4.e and A.4.b.5.c (only for orbits whose altitudes of the apogee and perigee are different) in Table A of Annex 2 to Appendix **4**.For the purposes of No. **11.49.2**, Resolution **[EUR-A7(A)-NGSO-FSS-BSS-MSS**-**Tolerance] (WRC‑23)** also applies for space stations of a non-GSO FSS, BSS or MSS system.     (WRC‑23)

Section III – Maintenance of the recording of frequency assignments to non-geostationary-satellite systems in the Master Register     (WRC‑19)

MOD EUR/65A22A1/5#1971

11.51 For frequency assignments to some non-geostationary-satellite systems in specific frequency bands and services, Resolution **35 (WRC‑19)** and Resolution **[EUR-7(A)-** **NGSO- FSS-BSS-MSS**-**Tolerance] (WRC‑23)** shall apply.     (WRC‑23)

APPENDIX 4 (REV.WRC‑19)

Consolidated list and tables of characteristics for use in the
application of the procedures of Chapter III

ANNEX 2

Characteristics of satellite networks, earth stations
or radio astronomy stations2    (Rev.WRC‑12)

Footnotes to Tables A, B, C and D

MOD EUR/65A22A1/6

**TABLE A**

GENERAL CHARACTERISTICS OF THE SATELLITE NETWORK OR SYSTEM,
EARTH STATION OR RADIO ASTRONOMY STATION     (Rev.WRC‑19)

|  |  |  |  |  |  |  |  |  |  |  |  |  |
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| **Items in Appendix** | ***A \_ GENERAL CHARACTERISTICS OF THE SATELLITE NETWORK OR SYSTEM, EARTH STATION OR RADIO ASTRONOMY STATION*** | **Advance publication of a geostationary-satellite network** | **Advance publication of a non-geostationary-satellite network or system subject to coordination under Section II of Article 9** | **Advance publication of a non-geostationary-satellite network or system not subject to coordination under Section II of Article 9** | **Notification or coordination of a geostationary-satellite network (including space operation functions under Article 2A of Appendices 30 or 30A)**  | **Notification or coordination of a non-geostationary-satellite network or system** | **Notification or coordination of an earth station (including notification under Appendices 30A or 30B)**  | **Notice for a satellite network in the broadcasting-satellite service under Appendix 30 (Articles 4 and 5)** | **Notice for a satellite network (feeder-link) under Appendix 30A (Articles 4 and 5)** | **Notice for a satellite network in the fixed-satellite service under Appendix 30B (Articles 6 and 8)** | **Items in Appendix** | **Radio astronomy** |
| … |  |  |  |  |  |  |  |  |  |  |  |  |
| A.4.b.4 | **For each orbital plane, where the Earth is the reference body:** |  |  |  |  |  |  |  |  |  | A.4.b.4 |  |
| … |  |  |  |  |  |  |  |  |  |  |  |  |
| A.4.b.4.d | the altitude, in kilometres, of the apogee of the space station (see No. **1.187**)Note: For FSS, BSS or MSS systems subject to Resolution **35 (WRC‑19)**, the difference between the altitude of the apogee of the space station and the distance of the apogee of the space station (Item A.4.b.4.p) shall be comprised between 6 357 and 6 378 kilometres |  |  | **X** |  | **X** |  |  |  |  | A.4.b.4.d |  |
| A.4.b.4.e | the altitude, in kilometres, of the perigee of the space station (see No. **1.187**)Note: For FSS, BSS or MSS systems subject to Resolution **35 (WRC-19)**, the difference between the altitude of the perigee of the space station and the distance of the perigee of the space station (Item A.4.b.4.q) shall be comprised between 6 357 and 6 378 kilometres |  |  | **X** |  | **X** |  |  |  |  | A.4.b.4.e |  |
| … |  |  |  |  |  |  |  |  |  |  |  |  |
| A.4.b.4.p | the distance, in kilometres, of the apogee of the space station (distance between the apogee of the space station and the centre of the Earth)Required only for FSS, BSS or MSS systems subject to Resolution **35 (WRC-19)** |  |  |  |  | + |  |  |  |  | A.4.b.4.p |  |
| A.4.b.4.q | the distance, in kilometres, of the perigee of the space station (distance between the perigee of the space station and the centre of the Earth)Required only for FSS, BSS or MSS systems subject to Resolution **35 (WRC-19)** |  |  |  |  | + |  |  |  |  | A.4.b.4.q |  |

ADD EUR/65A22A1/7#1973

Draft New Resolution [EUR-A7(A)-NGSO-FSS-BSS-MSS-Tolerance] (WRC‑23)

Tolerances for certain orbital characteristics of space stations
deployed as part of non-GSO FSS, BSS or MSS systems

The World Radiocommunication Conference (Dubai, 2023),

considering

*a)* that WRC‑19 invited the ITU Radiocommunication Sector (ITU‑R) to study as a matter of urgency, tolerances for certain orbital characteristics of the non-geostationary-satellite orbit (non-GSO) space stations of the fixed-satellite service (FSS), the broadcasting-satellite service (BSS) and the mobile-satellite service (MSS) to account for the potential differences between the notified and deployed orbital characteristics for the inclination of the orbital plane, the altitude of the apogee of the space station, the altitude of the perigee of the space station and the argument of the perigee of the orbital plane;

*b)* that ITU‑R only addresses interference management issue when using radio frequencies and does not regulate or manage any aspects related to physical objects in space and safety of space;

*c)* that non-GSO systems using highly-inclined orbits having an apogee altitude greater than 18 000 km and an orbital inclination between 35° and 145° are typically composed of only a few satellites, and the number of such systems notified represents only a small fraction of the number of notified non-GSO systems,

noting

that for the purposes of this Resolution, tolerances refer to the maximum variations allowed between the value notified and/or recorded for the orbital characteristics referred to in the *considering* above and those associated with the actual deployment of satellites of the non-GSO FSS, BSS or MSS under consideration,

recognizing

*a)* that the use of frequency assignments to non-GSO FSS, BSS and MSS are subject to the regulatory and operational limits stipulated in the Radio Regulations;

*b)* that Nos. **11.44C**, **11.49.2** and **11.51** required the deployment of satellites on notified orbital planes;

*c)* that operators, when designing their system, should take into account atmospheric drag (at altitudes at which it applies) and solar cycle predictions, which have an impact on the lifetime of the satellites;

*d)* that there are legitimate reasons for a satellite to operate at a deviation from the notified orbital characteristics of its associated ITU filing;

*e)* that satellites on highly elliptical orbits and highly inclined orbits have significant orbital precession rates and, consequently, restrictive orbital-keeping requirements and correction of orbital parameters may lead to a reduction of such satellites’ lifetimes and to frequent replacement;

*f)* that this Resolution defines the maximum acceptable variation of certain orbital characteristics of a non-GSO system to be considered as operating within its notified orbital characteristics and does not preclude coordination requests or notification filings under Articles **9** and **11** of the Radio Regulations for other non-GSO systems at the same altitude and tolerance;

*g)* that administrations and their operators may establish separate operational arrangements regarding coexistence of the physical orbits of satellite systems and networks, including satellites in geostationary-satellite orbits and non-GSO, and that such arrangements are not addressed by the Radio Regulations, which deal with avoidance of harmful interference due to radio-frequency usage;

*h)* that orbital tolerances should take into account operational requirements of non-GSO systems;

*i)* that significant discrepancies between the operational orbital plane(s) of a non-GSO system and the notified orbital plane(s) for those systems as recorded in the Master International Frequency Register (Master Register) could negatively impact the efficient use of the orbit and spectrum resource;

*j)* that transitional rules could be required for certain non-GSO systems, to take into account such new tolerance rules,

resolves

1 that, as of the entry into force of the Final Acts of WRC‑23 for space stations with an eccentricity[[1]](#footnote-1)1 less than 0.5 notified as part of a non-GSO FSS, BSS or MSS systems subject to Resolution **35** **(WRC‑19)** with an apogee altitude less than 15 000 km:

*a)* the observed variation for the distances (Δ*dist\_perigeeObserved*  and Δ*dist\_apogeeObserved*) for both perigee and apogee with regard to the notified distance (Appendix **4** data items A.4.b.4.p and A.4.b.4.q), shall not exceed the allowed variation *ΔdistAllowed* (see the Annex to this Resolution);

*b)* the observed variation for the inclination (Δ*iObserved*) with regard to the inclination notified shall not exceed allowed variation for the inclination (Δ*iAllowed*) (see the Annex to this Resolution);

2 that, as of the entry into force of the Final Acts of WRC‑23, any space station deployed as part of a non-GSO FSS, BSS or MSS system subject to Resolution **35** **(WRC‑19)** that has received an unfavourable finding under *resolves*1:

*a)* shall not cause unacceptable interference to and shall not claim protection from the other systems;

*b)* shall not be considered in the deployment information submitted under *resolves* 7 and 8 of Resolution **35 (WRC‑19)** except if the tolerances referred to in *resolves* 1, as appropriate, is not exceeded for a maximum of 60 consecutive days;

3 that, as of the entry into force of the Final Acts of WRC‑23, if all the space stations referred to in a submission to the Bureau under Nos. **11.44C** or **11.49.2** for a non-GSO FSS, BSS or MSS satellite system subject to Resolution **35 (WRC‑19)** that has received an unfavourable finding under *resolves*1, this submission shall not be considered as compliant with Nos. **11.44C** or **11.49.2** accordingly;

4 that, for non-GSO systems to which *resolves*1 applies and for which latest notification information was received prior to 16 December 2023, the notifying administration could communicate to the Radiocommunication Bureau (BR) no later than 1 July 2024 updated operational parameters;

5 that, in absence of submission of a new notification information according to *resolves*3, BR shall consider that:

*a)* the distance of the apogee of the space station (Appendix **4** data item A.4.b.4.p) is equal to the sum of the altitude of the apogee of the space station (Appendix **4** data item A.4.b.4.e) and 6 378 km;

*b)* the distance of the perigee of the space station (Appendix **4** data item A.4.b.4.q) is equal to the sum of the altitude of the perigee of the space station (Appendix **4** data item A.4.b.4.d) and 6 378 km;

6 that, upon receipt of the modifications to the characteristics of the non-GSO system as referred to in *resolves* 4:

*a)* BR shall promptly make this information available “as received” on the ITU website;

*b)* BR shall conduct an examination for compliance with Nos. **11.43A/11.43B**, as appropriate;

*c)* BR, for the purpose of No. **11.43B**, shall retain the original dates of entry of the frequency assignments in the Master Register if:

i) BR reaches a favourable finding under No.**11.31**; and

ii) the altitude differences of the perigee and apogee of each plane between the new parameters submitted as referred to in *resolves*4 and the latest notification information received by BR prior to 16 December 2023, are lower than [50-75][[2]](#footnote-2)\* km; and

iii) the inclination differences of each plane between the new parameters submitted as referred to in *resolves* 4 and the latest notification information received by BR prior to 16 December 2023, are respectively lower than 3 degrees; and

iv) the modifications are limited to any Appendix **4** data item A.4.b.4 (Rev.WRC‑23) except Appendix **4** data item A.4.b.4.b (i.e. the number of satellites in the orbital plane) and any Appendix **4** data items A.14, A.4.b.6.a and A.4.b.7; and

v) the notifying administration provides a commitment stating that the characteristics as modified will not cause more interference nor require more protection nor impose additional constraints to other systems than if the space station was deployed according to the characteristics provided in the latest notification information published in Part I‑S of the BR International Frequency Information Circular (BR IFIC) for the frequency assignments (see Appendix **4** data item A.23.a);

*d)* BR shall publish the information provided and its findings in the BR IFIC;

*e)* the modified assignments received a favourable finding under No. **11.31** with respect to Article **22** using the latest version of the equivalent power flux-density (epfd) validation software;

7 that, upon receipt by BR, from 16 December 2023, of a first notification under No. **11.28** of the non-GSO system to which *resolves 1* applies for the purpose of No.**9.27** and **11.32**, BR shall retain the original date of protection if:

*a)* the altitude differences of the perigee and apogee of each plane between the parameters submitted on its notification under No. **11.28** and the information submitted under No. **9.30**, are lower than [50-75]\* km; and

*b)* the inclination differences of each plane between the parameters submitted on its notification under No. **11.28** and the information submitted under No. **9.30** are respectively lower than 3 degrees; and

*c)* the modifications are limited to any Appendix **4** data item A.4.b.4 (Rev.WRC‑23) except Appendix **4** data item A.4.b.4.b (the number of satellites in the orbital plane) and any Appendix **4** data items  A.14, A.4.b.6.a and A.4.b.7; and

*d)* the notifying administration provides a commitment stating that the characteristics as modified will not cause more interference to, nor require more protection from, nor impose additional constraints on, other systems than if the space station was deployed according to the characteristics submitted under No. **9.30**; and

*e)* the modified assignments received a favourable finding under No. **11.31** with respect to Article **22** using the latest version of the epfd validation software,

instructs the Radiocommunication Bureau

1 to take the necessary actions to implement this Resolution;

2 to report any difficulties it encounters in the implementation of this Resolution to WRC‑27.

Annex to Draft New Resolution [EUR-A7(A)-NGSO-FSS-BSS-MSS-Tolerance] (WRC‑23)

Determination of the variation for the distance of the apogee, distance
of the perigee and the inclination for non-GSO space station

1 The observed variation for the distance of the perigee of the space station (Δ*dist\_perigeeObserved*) of a non-GSO satellite is equal to:

      in kilometres

where:

 *dist\_perigeed* is the observed value of the distance in kilometres of the deployed satellite at the perigee (distance between the perigee of the space station and the centre of the Earth)

 *dist\_perigeen* is the value of the distance of the perigee in kilometres of the associated notified orbital plane of the non-GSO system (Appendix **4** data item A.4.b.4.q).

2 The observed variation for the distance of the apogee of the space station (Δ*dist\_apogeeObserved*) of a non-GSO satellite is equal to:

      in kilometres

where:

 *dist\_apogeed* is the observed value of the distance in kilometres of the deployed satellite at the apogee (distance between the apogee of the space station and the centre of the Earth)

 *dist\_apogeen* is the value of the distance of the apogee in kilometres of the associated notified orbital plane of the non-GSO system (Appendix **4** data item A.4.b.4.p).

3 The allowed variation for the distance (Δ*distAllowed*) of a non-GSO satellite is equal to the following (fixed value in kilometres to be applied to all non-GSO systems’ orbit altitudes):

      in kilometres

4 The observed variation for the inclination (Δ*iObserved*) of a non-GSO satellite is equal to:

      in degrees

where:

 *id* is the observed inclination in degrees of the deployed satellite

 *in* is the inclination in degrees of the associated notified orbital plane of the non-GSO system.

5 The allowed variation for the inclination (Δ*iAllowed*) of a non-GSO satellite is equal to:

      in degrees

\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. 1 The eccentricity, *e*,is equal to: ,

where:

 *Ra* is the distance from the centre of the Earth to the satellite at apogee

 *Rp* is the distance from the centre of the Earth to the satellite at perigee. [↑](#footnote-ref-1)
2. \* CEPT has agreed to target a specific value within this range in brackets. [↑](#footnote-ref-2)