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| **The 6th Meeting of the APT Conference Preparatory Group for WRC-23 (APG23-6)** | **APG23-6/OUT-41** |
| 14 – 19 August 2023, Brisbane, Australia | 19 August 2023 |

Working Party 4

**APT VIEW and Preliminary APT Common Proposal**

**on WRC-23 agenda item 7 (TOPIC A)**

**Agenda Item 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.*

# Topic A: Tolerances for Certain Orbital Characteristics of Non-GSO Space Stations in the FSS, BSS and MSS

**1. Background**

* WRC-19 invited the 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.”[[1]](#footnote-1)
* The objective of these studies would be to determine the allowable differences between the values recorded in the MIFR for the specified orbital characteristics of non‑GSO space stations operating on notified frequency assignments and those representative of the actual deployment of these non-GSO space stations. Studies of tolerances arise from the obligations stipulated in the RR No. **11.44C** and No. **11.49.2** (and its associated sub-footnotes)**,** Resolution **35 (WRC-19)** and RR Appendix **4**.
* The concept of orbital tolerances for a space station on board a GSO satellite already exists with, in particular, item A.4.a.2 (Orbital tolerances) and its associated sub items, A.4.a.2.a (the planned longitudinal tolerance easterly limit), A.4.a.2.b (the planned longitudinal tolerance westerly limit) and A.4.a.2.c (the planned inclination excursion). Effective limits on some of these tolerances are contained elsewhere in the Radio Regulations (e.g., the constraint on E/W longitudinal tolerances for GSO satellites operating in unplanned bands in Section III of RR Article **22**). However, there are no equivalent limits for tolerances in RR Appendix **4** for a space station on board a non-GSO satellite. This difference was recognized during discussions at WRC-19 on the BIU of frequency assignments to non-GSO satellite systems and on the milestone-based approach for the implementation of frequency assignments to space stations in a non-geostationary orbit satellite system in specific frequency bands and services. This recognition led to the invitation for study mentioned above.
* A certain degree of flexibility regarding any deviation from the characteristics of a notified orbital plane, i.e. the altitude of the perigee, the altitude of the apogee, the inclination and the argument of the perigee (for HEO systems) needs to be provided under certain circumstances and conditions as informed by the notifying administration responsible for the system.
* Although studies have been conducted with a view to identifying allowable deviation/tolerance values for altitudes of apogee/perigee and inclination for a space station in a non-GSO notified orbit, there has been no definitive conclusion on an allowable limit for any of these parameters that would both provide certainty and not unnecessarily constrain efficient use of the orbital/spectrum resource by non-GSO systems.
* The ITU-R studies developed a working document on Topic A which was for information purpose only, called “Supporting materials that were developed to address WRC-23 agenda item 7 Topic A” ([Document 4A/978(Annex 20)](https://www.itu.int/dms_ties/itu-r/md/19/wp4a/c/R19-WP4A-C-0978%21N20%21MSW-E.docx)).
* There are 4 methods shown in Section 4/7/1.4 of the [final CPM Report](https://www.itu.int/dms_pub/itu-r/md/19/cpm23.2/r/R19-CPM23.2-R-0001%21%21MSW-E.docx):
	+ Method A1: No change to the Radio Regulations.
	+ Method A2: A draft new WRC-23 Resolution on the implementation of tolerances for certain orbital characteristics of satellites of non-GSO FSS/BSS or MSS systems to be referred to in RR Nos. **11.44C.1, 11.49.2 and 11.51**
	+ Option A (with 4 sub-options) to apply tolerances for NGSO FSS, BSS, MSS systems (either with eccentricity <0.5/TBD or more broadly), or to those subject to Resolution **35(WRC-19)** (either with eccentricity <0.5/TBD or more broadly)
	+ Option B: Option B is to apply 2 sets of tolerances for certain NGSO FSS, BSS, MSS systems, to reflect changes between notification and coordination and deployed characteristics and notification
	+ Method A3: Modify RR Appendix 4 data items related to the planned tolerances for each of the four orbital characteristics for non-GSO systems subject to RR No. **11.44C** and refer to them in the relevant provisions of RR Article 11 and in Resolution **35 (WRC-19)**
	+ Method A4: New footnotes in RR Article **11** pointing to a draft new WRC‑23 Resolution, applicable to the Resolution **35 (WRC-19)** frequency bands, calling for periodic reporting on the altitude and inclination of deployed satellites and providing provisions for ensuring that deviations, excluding temporary deviations, do not increase interference or require additional protection

**2. Documents**

* Input Documents AP23-6/[INP-20(IND)](https://www.apt.int/sites/default/files/2023/08/APG23-6-INP-20_India_WP4_PACP_WRC-23_Agenda_Items.docx), [INP-39(J)](https://www.apt.int/sites/default/files/2023/08/APG23-6-INP-39_Japan_WP4_Views_WRC-23_Agenda_Item_7.docx), [INP-50(INS)](https://www.apt.int/sites/default/files/2023/08/APG23-6-INP-50_Indonesia_WP4_PACP_WRC-23_Agenda_Items.docx), [INP-56(SNG)](https://www.apt.int/sites/default/files/2023/08/APG23-6-INP-56_Singapore_WP4_PACP_WRC-23_Agenda_Items_0.docx), [INP-61(THA)](https://www.apt.int/sites/default/files/2023/08/APG23-6-INP-61_Thailand_WP4_PACP_WRC-23_Agenda_Items.docx), [INP-68(IRN)](https://www.apt.int/sites/default/files/2023/08/APG23-6-INP-68_Iran_WP4_Preliminary_Views_on_WRC-23_Agenda_Items.docx), [INP-83(AUS)](https://www.apt.int/sites/default/files/2023/08/APG23-6-INP-83_Australia_WP4_PACP_WRC-23_Agenda_Items.docx), [INP-90(Rev.1)(KOR)](https://www.apt.int/sites/default/files/2023/08/APG23-6-INP-90R1_KOR_WP4_PACP_WRC-23_Agenda_Items.docx), [INP-106(CHN)](https://www.apt.int/sites/default/files/2023/08/APG23-6-INP-106_China_WP4_PACP_WRC-23_Agenda_Items.docx), [INP-112(MLA)](https://www.apt.int/sites/default/files/2023/08/APG23-6-INP-112_Malaysia_WP4_PACP_WRC-23_Agenda_Items.docx), [INP-120(VTN)](https://www.apt.int/sites/default/files/2023/08/APG23-6-INP-120_VietNam_WP4_PACP_WRC-23_Agenda_Items.docx), [INP-131(TON)](https://www.apt.int/sites/default/files/2023/08/APG23-6-INP-131_Tonga-WP4-Views_and_PACP_on_WRC-23_Agenda_Item_7A_7J.docx)
* Information Documents APG23-6/[INF-35(Chairs of DG 7)](https://www.apt.int/sites/default/files/2023/08/APG23-6-INF-35_Brief_on_AI_7.docx), [INF-45(RCC)](https://www.apt.int/sites/default/files/2023/08/APG23-6-INF-45_Status_of_RCC_preparation_to_WRC-23.pdf), [INF-46(CEPT)](https://www.apt.int/sites/default/files/2023/08/APG23-6-INF-46_Status_of_CEPT_preparation_for_WRC-23_and_RA-23.pdf), [INF-52(CITEL)](https://www.apt.int/sites/default/files/2023/08/APG23-6-INF-52_CITEL_preparation_for_WRC-23.pdf)

**3. Summary of discussions**

**3.1 Summary of APT Members’ views**

**3.1.1 India (Republic of) – Document APG23-6/INP-20**

* India supports Method A2 with an adequate absolute value in kilometers or a formula that defines the tolerance based on the orbit altitude. India believes that the tolerances defined need to provide adequate flexibility for NGSO systems to deploy as planned. For example, NGSO systems maintain a separation of several kilometers between each of its planes to avoid the possibility of collisions between its own satellites. Further, providing adequate flexibility would enable NGSO operators to accommodate new systems without having a negative impact on the status of their ITU filing.

**3.1.2 Japan – Document APG23-6/INP-39**

* For **Topic A**, Japan supports the development of the definition of tolerances of non-geostationary-satellite orbit (non-GSO) space stations in the FSS, BSS and MSS.
* Method A2 Option A can be supported, with further consideration of what satellite networks to target. Japan also supports implementable and practical values of non-GSO Orbital tolerances.

**3.1.3 Indonesia (Republic of) – Document APG23-6/INP-50**

* Indonesia is of the view that to facilitate equitable access to the non-geostationary orbit and efficient use of radio frequency spectrum, including to maintain the interference environment between non-GSO satellite systems and GSO satellites and maximizing the non-geostationary orbit spectrum capacity, the tolerance of orbital characteristics of space stations of non-GSO FSS, BSS or MSS systems shall be regulated that is as narrow as possible currently achievable by real system.
* In this regard, Indonesia supports Method A2 option A as a possible solution to address this agenda item.

**3.1.4 Singapore (Republic of) – Document APG23-6/INP-56**

* Singapore has the following positions:
	+ WRC-23 decision on orbital tolerances should ensure a balance between managing the interference environment while not unduly restricting operations of non-GSO systems in the FSS/BSS/MSS.
	+ supports the development of the definition of tolerances limited to the four orbital characteristics identifying a “notified orbital plane”, for non-GSO FSS, BSS and MSS systems subject to Resolution **35 (WRC-19)**.
	+ supports the development of these tolerances in the context of ITU regulatory procedures such as BIU, BBIU and the milestone-based approach. In the absence of such tolerances it is unclear whether the requirements of Resolution **35 (WRC-19)** are met.
	+ Supports, except under No. **11.44C** and No. **11.49.2** that tolerances could be temporarily exceeded for a short period of time to permit rephasing of satellites in an orbit-plane after a launch of new non-GSO space stations.
	+ supports the development of appropriate regulatory consequences for frequency assignments to non-GSO space stations that do not maintain these to-be-developed orbital tolerances.
	+ does not support allowing notifying administrations to determine the orbital tolerance values for their own NGSO systems.
	+ to allow already notified NGSO systems, under specific conditions, the possibility to update its notified orbital parameters in order to be aligned with its deployed characteristics, without any regulatory impact on its filings.
	+ supports Method A2 Option A2A4 i.e. a draft new WRC-23 Resolution on the implementation of tolerances for certain orbital characteristics of satellites of NGSO FSS/BSS or MSS systems, Option A2A4 for space stations with orbital eccentricity less than 0.5 notified as part of NGSO FSS, BSS or MSS system subject to Resolution **35 (WRC-19)** with apogee altitude less than 15000 km. With regards to the tolerance range, Singapore supports Option 1 for the variation for the altitude and the inclination of a non-GSO satellite.

**3.1.5 Thailand (Kingdom of) - Document APG23-6/INP-61**

* Thailand is of the view that the necessary transitional measures for the application of the decision of WRC-23 may need to be developed and reflected in the draft new Resolution.
* Thailand is of the view that there is a need of a new WRC Resolution with specific regulatory measures to allow for variation from the notified orbital plane characteristics, including temporary variation, of non-GSO satellite systems. Therefore, Thailand prefers Method A2 in the CPM Report.

**3.1.6 Iran (Islamic Republic of) – Document APG23-6/INP-68**

* Islamic Republic of Iran support the development of the definition of tolerances of non-geostationary-satellite orbit (non-GSO) space stations in the FSS, BSS and MSS. This Administration supports the development of these tolerances in the context of ITU regulatory procedures such as bringing into use (BIU), bringing back into use (BBIU) and the milestone-based approach.
* Islamic Republic of Iran is of the view that the development of the definition of tolerances of non-GSO space stations in the FSS, BSS and MSS, should be limited to 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, to account for potential differences between the notified and deployed orbital characteristics.
* Islamic Republic of Iran is also of the view that appropriate regulatory consequences/measures should be developed taking into account the operational aspects of the non-GSO space stations in the FSS, BSS and MSS, if the operations are beyond the specified allowable tolerances. These regulatory measures should be implementable and not have any retroactive application. Moreover, necessary transitional measures for application of the decision of WRC-23 may need to be developed.
* It is important to recognize that the design considerations (including, the impact of atmospheric drag for systems at low-Earth orbit altitudes, e.g., lower than 700 km), the need to ensure safe flight operations between satellites in the same and/or other systems, *inter alia*, can lead to notifying administrations needing to operate some space stations in orbital parameters that are at variance from the notified orbital parameters or to employ orbital practices that do not increase interference or protection requirements. Furthermore, there are legitimate reasons for variations from notified orbital plane parameters (A.4.b.4.a, A.4.b.4.d, A.4.b.4.e and A.4.b.4.i), and it is important not to over-regulate deviations/tolerances in a way that limits administrations’ flexibility, and that does not inappropriately limit entry of additional systems. The degree of tolerances subject to this agenda item is an objective value that may be accepted in order to allow the proper deployment of the systems, and avoid over-regulation during the deployment of the systems.
* Although studies have been conducted in section 4/7/1.3.1 of the draft CPM23-2 Report with a view to identifying allowable deviation/tolerance values for altitudes of apogee/perigee and inclination for a space station in a non-GSO notified orbit, there has been no definitive conclusion on an allowable limit for any of these parameters that would both provide certainty and not unnecessarily constrain efficient use of the orbital/spectrum resource by non-GSO systems.
* The studies conducted under this topic have not considered the case of several non-GSO systems sharing the same altitude for all or some of their orbital planes as it could be already observed in the characteristics of some already notified non-GSO systems. This matter will need to be taken into account when developing deviation/tolerance values under this topic.
* However, considering the above mentioned, Islamic Republic of Iran support Method A2 option A together with a draft new WRC-23 Resolution on the implementation of tolerances for certain orbital characteristics of satellites of non-GSO FSS/BSS or MSS systems to be referred to in RR Nos. 11.44C.1, 11.49.2 and 11.51.
* Under this method, it is proposed to have a new WRC Resolution with specific regulatory measures to allow for variation from the notified or recorded orbital plane characteristics, including temporary variation for operational purposes, e.g. reorganization of satellites in an orbit-plane after a launch of new non-GSO space stations. It is also proposed to consider space stations which do not respect the tolerances, including those specified for temporary variation, as not in compliance with notified and/or recorded orbital parameters of the associated non-GSO system and as such, should not be considered as compliant with RR Nos. **11.44C**, **11.49.2** and **11.51**, as applicableaccordingly.
* Two options are proposed under this method for the Resolution:
	+ Option A proposes to apply these tolerances, including temporary variation, for satellites of all non-GSO FSS, BSS or MSS systems (either with an eccentricity < 0.5/TBD or more broadly), or to non-GSO FSS, BSS or MSS systems subject to Resolution **35 (WRC-19)** (either with an eccentricity < 0.5/TBD or more broadly);
	+ In Option B, the orbital elements are updated at the notification stage to reflect the final design. Therefore, Option B proposes to apply two sets of tolerances for satellites of certain non-GSO FSS, BSS or MSS systems with regard to changes between coordination and notification filings, as well tolerances, including temporary variation, between notification filings and deployed characteristics.
* This Resolution needs to be referred to in relevant provisions of RR Article **11**.
* Under both options, it is a general understanding that, like the 0.5° agreed tolerance for GSO network, as long as one operates within the tolerances, orbital variations between notified and operational parameters could be considered as negligible. But if the variations are outside the tolerances, the notifying administration shall demonstrate under 11.43B that the operational parameters will not create more interference nor require more protection.
* Values for altitude and inclination yet to be developed and agreed at WRC-23.
* Islamic Republic of Iran supports Method A2 Option A, as presented in the draft CPM23-2 Report.
* Islamic Republic of Iran proposes a Preliminary APT Common Proposal for Method A2 Option A with some modifications are highlighted in yellow, as outlined in the draft CPM Report as follows:



**3.1.7 Australia – Document APG23-6/INP-83**

* The scope of any studies should be limited to the differences between the notified and deployed non-GSO 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. Australia supports regulatory methods that are not too stringent on operators so they can make genuine adjustments to the orbits of NGSO satellites based on the operational requirements. Sufficient flexibility should be provided to NGSO systems. Australia does not support the expansion of the scope of this topic outside those frequencies in Resolution 35 (WRC-19). Australia is of the view that orbital tolerance should be defined with the objective of maintaining alignment between MIFR and deployed systems and should be based on the changes to interference environment. Tolerances should be determined in such a way that it avoids adverse impact on the other co-frequency services and systems. Australia does not support tolerances that are lacking support from agreed studies and/or are operator specific. Australia supports transitional measures for systems already submitted to the BR prior to WRC-23, to update their notified orbital parameters with their operational orbital parameters based on a recognition that such modifications should not adversely impact on their date of receipt or lead to the necessity to complete additional coordination.
* Australia does not propose a Preliminary APT Common Proposal for this topic.

**3.1.8 Korea (Republic of) – Document APG23-6/INP-90(Rev.1)**

* As the Republic of Korea supports the development of the definition of tolerances of non-geostationary-satellite orbit (non-GSO) space stations in the FSS, BSS and MSS subject to Resolution **35 (WRC-19)**, among the methods presented in the CPM Report, Method A2 (preferring Option A) is supported.

**3.1.9 China (People’s Republic of) – Document APG23-6/INP-106**

* China supports option A with fixed percentage of orbit altitude tolerances in Method A2 to develop a new Resolution on the implementation of tolerances for the certain orbital characteristics of non-GSO space stations in FSS, BSS and MSS, so that administrations could analyse the compatibility between non-GSO satellite systems and rational and compatible use of non-GSO orbit and spectrum resources. China supports the possibility of exceeding the tolerances referred to in the resolution for a maximum of 90 consecutive days in the conduct of investigations under RR No. 13.6.
* China supports the development of these tolerances in the context of RR notification and recording of frequency assignments procedures such as BIU and the milestone-based approach. China advises to use a fixed value for orbits above a particular height and a fixed percentage for orbits below that height because the usage of a fixed percentage will result in a much higher tolerance value for the orbit above that height. China favors acceptable orbital altitude limits and opposes a too lenient one, noting that orbital resources, particularly low-orbit resources, are becoming increasingly scarce.
* China also supports the development of appropriate regulatory consequences for frequency assignments to non-GSO space stations, such as RR Nos. 11.44C, 11.49.2 and Resolution 35, if it operates beyond the specified allowable tolerances.
* China proposes views mentioned above as APT common proposals.

**3.1.10 Malaysia – Document APG23-6/INP-112**

* Malaysia supports the development of the definition of tolerances of non-GSO space stations that operate in the FSS, BSS and MSS, limited to the differences between the notified and deployed non-GSO 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.
* While a certain degree of flexibility regarding any deviation from the characteristics of a notified orbital plane is required, Malaysia concurs that it is important not to over-regulate deviations/tolerances in a way that limits administrations’ flexibility, and that does not inappropriately limit entry of additional systems.
* At the same time, Malaysia is of the view that appropriate regulatory consequences/measures need to be developed taking into account the operational aspects of the non-GSO space stations in the FSS, BSS and MSS, if the operations are beyond the specified allowable tolerances.

**3.1.11 Vietnam (Socialist Republic of) – Document APG23-6/INP-120**

* Vietnam is of the view to support method A2 that proposes a draft new WRC-23 Resolution on the implementation of tolerances for certain orbital characteristics of satellites of non-GSO FSS, BSS or MSS systems to be referred to in RR Nos. **11.44C.1**, **11.49.2** and **11.51.**

*Reason:*

* *Under this method, it is proposed to have a new WRC Resolution with specific regulatory measures to allow for variation from the notified or recorded orbital plane characteristics, including temporary variation for operational purposes, e.g. reorganization of satellites in an orbit-plane after a launch of new non-GSO space stations;*
* *It is also proposed the regulatory consequences for frequency assignments to non-GSO space stations that do not maintain or exceed the orbital tolerance.*

**3.1.12 Tonga (Kingdom of) – Document APG23-6/INP-131**

* The latest Working Party 4A (June/July 2023) received contributions showing how determining orbital tolerances is a complex exercise and implies taking into account several factors, including:
* Characteristics of the non-GSO system involved and LEO orbits
* Orbit optimization to avoid collisions between satellites in the same constellation and keep altitude constant at given latitudes (e.g. frozen orbits)
* Physical co-existence between collaborative and non-collaborative systems at similar orbital altitudes
* [For systems flying lower than 600/700 km] The effect of atmospheric drag on satellites and the variations of such atmospheric drag with solar activity
* Launch orbit injection accuracy
* The driving factor in terms of tolerance value was shown to be co-existence of systems at similar orbits. In case of collaborative systems and based on 4A studies, an absolute minimum tolerance of 50 km would be needed. In case of non-collaborative systems, operators will require an absolute minimum tolerance of 70 km (considering a reasonable buffer of 5-10 km).
* A frozen orbit is one chosen to minimize the effect of perturbations on a selected set of mean orbital elements. For many systems, frozen orbits are chosen to keep altitude constant at given latitudes. For example, if an argument of perigee is selected at 90 degrees, then perigee will always be at the highest Northern latitude and apogee will always be at the highest Southern latitude. One use of frozen orbits for large constellations is to reduce the number of conjunction events within the same orbital shell and between shells in close proximity. In most cases, increasing eccentricity, and therefore a difference in apogee and perigee, is used to implement frozen orbits.
* Some comments were expressed during WP4A that an operator should notify the precise parameters of the frozen orbits (or anyway the orbital disposition) at notification stage, anyway, this is not possible, as an operator cannot predict the exact parameters of the frozen orbits at notification stage. Moreover, these parameters may have to be adapted / change during the course of the lifetime of the system and the eccentricity value of the single satellites may have to be changed several / numerous times. So, flexibility is needed for NGSO operators. Removing flexibility would simply result in penalizing some NGSO systems with specific characteristics.
* To conclude, studies have shown that a tolerance less than 50 km would basically result in orbit warehousing by a single system even in case of collaborative systems. And this value elevates to 70 km in case of non-collaborative systems. Consequently, Tonga invites APG23-6 to adopt 70 km as minimum tolerance value and baseline, and 3 deg for inclination.
* On a last note, Tonga highlights how the latest 4A demonstrated how straightforward is to manage interference into potential victims so that it is not worsened. In Downlink it is enough to keep the PFD constant on the ground. In Uplink it is enough to respect the uplink emission envelope of the filing or the eirp mask submitted as per of the epfd submission. Consequently, the final choice really boils down to whether administrations want to assign enough flexibility to NGSO systems or penalize them.
* Some administrations expressed the view that providing a wide tolerance such as 70 km would result in uncertainty for other systems / new entrants. This is not the case. Every NGSO operators, before launching, makes the needed arrangements and agreements with other relevant NGSO operators in order to minimize threats and risks. These arrangements / agreements do not depend on ITU, and in most cases they are bilateral agreements. Consequently, these kind of analyses and agreements would be in place even if the ITU did not decide on tolerances or if the tolerances were as little as 1 km or as large as 150 km. In brief, the ITU’s decision on tolerances would not impact in any way the strategic decision of operators to launch at specific altitudes and with specific orbit parameters. The first party interested in ensuring safe flights operations and pacific co-existence with others is the system operator itself, and its decisions are not dependant on ITU’s ruling on topic A. And every concerned party knows well where the satellites of the others are at any point in time thanks to commonly-used real-time databases and tools

**Suggested edits to the APT Preliminary view on AI 7 Topic A**

* APT Members support the development of the definition of tolerances of non-geostationary-satellite orbit (non-GSO) space stations in the FSS, BSS and MSS. APT Members support the development of these tolerances in the context of ITU regulatory procedures such as bringing into use (BIU), bringing back into use (BBIU) and the milestone-based approach.
* APT Members are of the view that the development of the definition of tolerances of non-GSO space stations in the FSS, BSS and MSS, should be limited to 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, to account for potential differences between the notified and deployed orbital characteristics.
* APT Members are also of the view that appropriate regulatory consequences/measures should be developed taking into account the operational aspects of the non-GSO space stations in the FSS, BSS and MSS, if the operations are beyond the specified allowable tolerances. These regulatory measures should be implementable and not have any retroactive application. Moreover, necessary transitional measures for application of the decision of WRC-23 may need to be developed.
* APT Members do not support overregulation nor regulatory methods that are too stringent and inflexible, to allow the operation of existing and new satellites with the possibility to make adjustments to them, in order to comply with the established orbital tolerances.
* APT Members support Method A2 presented in the draft CPM Report together with the consideration in that Method of implementable and practical values, i.e. 70 km for orbital altitude and 3 degrees for orbital inclination.

**3.2 Summary of issues raised during the meeting**

* APT Members need further consideration on the appropriate range of orbital tolerance values to be supported under this Topic. See Section 6 for further details.

**4. APT View(s)**

* APT Members support the development of the definition of tolerances of non-geostationary-satellite orbit (non-GSO) space stations in the FSS, BSS and MSS with frequency assignments subject to Resolution **35 (WRC-19)**. APT Members support the development of these tolerances in the context of ITU regulatory procedures such as bringing into use (BIU), bringing back into use (BBIU) and the milestone-based approach.
* APT Members are of the view that the development of the definition of tolerances of non-GSO space stations in the FSS, BSS and MSS, should be limited to 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, to account for potential differences between the notified and deployed orbital characteristics.
* APT Members are also of the view that appropriate regulatory consequences/measures should be developed under Nos. **11.44C**, **11.49.2** and **11.51,** taking into account the operational aspects of the non-GSO space stations in the FSS, BSS and MSS with frequency assignments subject to Resolution **35 (WRC-19)**, if the operations are beyond the specified allowable tolerances. These regulatory measures should be implementable and not have any retroactive application. Moreover, necessary transitional measures for application of the decision of WRC-23 may need to be developed.
* APT Members do not support overregulation nor regulatory methods that are too stringent and inflexible, to allow the operation of existing and new satellites with the possibility to make adjustments to them, in order to comply with the established orbital tolerances.
* For frequency assignments of non-GSO systems in the FSS, BSS and MSS subject to Resolution **35 (WRC-19)** notified prior to the entry into force of the Final Acts of WRC-23, APT Members support allowing an update to the notified orbital parameters within a reasonable range, based on the conditions of the new draft Resolution, in order to align with the actual deployed characteristics, without changing the date of receipt of the associated notice.
* APT Members support Method A2 Option A of the CPM Report.

**5. Preliminary APT Common Proposal**



**6. Issues for Consideration at APG Coordination Meeting at WRC-23 (if any)**

* Some APT Members consider together with Method A2 Option A, implementable and practical orbital tolerance values of 10 to 50 km or using formula based approach for orbital altitude and 2 to 3 degrees for orbital inclination.
* Some APT Members support tolerance values of 70 km. Such value would allow enough flexibility to ensure co-existence of multiple collaborative or non-collaborative systems at similar orbital altitudes, as per studies submitted to the WP 4A of June/July 2023.
* Some APT Members consider the tolerance of orbital characteristics of space stations of non-GSO FSS, BSS or MSS systems shall be regulated that is as narrow as possible currently achievable by real system.
* Some APT Members support fixed percentage of orbit altitude tolerances, and to use a fixed value for orbits above a particular height and a fixed percentage for orbits below that height.

**7. Views from Other Organisations**

**7.1 Regional Groups**

**7.1.1 ASMG – (as of February 2023)**

* Support studies on acceptable tolerances for the following orbital characteristics:
	+ 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
* The development of tolerances under this topic will be limited to the FSS, BSS and MSS systems.
* Develop regulatory measures to determine tolerances with respect to orbital characteristics, provided granting flexibility for satellite operators to manage their satellites, and prevent non-compliance with the reported orbital characteristic.

**7.1.2 ATU – (as of February 2023)**

* Support studies on identifying acceptable tolerances for the following 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;
* Agree that:
1. The development of tolerances under this topic should be limited to the fixed-satellite service, the broadcasting-satellite service and the mobile-satellite service.
2. Specific regulatory measures for tolerances ought to be taken in order to avoid collision with another non-geostationary space station. Tolerances for the orbital characteristics should on one hand provide flexibility of satellite operators to manoeuvre their satellites without wasting too much fuel on the other hand provide no room for abuse to go out of the notified orbital characteristics;
3. Special cases in the orbiting phase should be taken into account and that regulatory procedures should clearly define this.
4. Appropriate regulatory provisions ought to be developed for frequency assignments to non-GSO space stations that do not maintain or exceed the orbital tolerances and the effects that will result from these exceedances on the file submitted to the ITU.
	* 1. **CEPT – Document APG23-6/INF 46**
* CEPT supports the development of the definition of tolerances limited to the orbital characteristics below of non-GSO space stations in FSS, BSS and MSS identifying a “notified orbital plane”:
* the inclination of the orbital plane,
* the altitude of the apogee of the orbit of the space station,
* the altitude of the perigee of the orbit of the space station, except in the case of HEO orbits
* CEPT supports the development of these tolerances only for FSS, BSS and MSS systems subject to Resolution 35 (WRC-19) in the context of ITU regulatory procedures such as BIU, BBIU and the milestone-based approach. In the absence of such tolerances, it is unclear whether the requirements of Resolution 35 (WRC-19) are met.
* CEPT supports, except under No. 11.44C and 11.49.2, that tolerances could be temporarily exceeded for a short period of time to permit rephasing of satellites in an orbit-plane after a launch of new non-GSO space stations.
* CEPT supports appropriate regulatory consequences under Nos. **11.44C**, **11.49.2** and **11.51** for frequency assignments to non-GSO space stations that do not maintain these to-be-developed orbital tolerances.
* CEPT does not support methods permitting notifying administrations to self-declare the expected orbital altitude and inclination variations
* CEPT supports defining orbital tolerances such that the operation of non-GSO systems within those tolerances does not adversely impact the interference environment of other networks, systems and services.
* CEPT supports for all networks to align their notified orbital characteristics with deployed orbital characteristics without regulatory implication subject to a maximum difference allowed between the notified and deployed orbital characteristics of the satellite system.
* CEPT supports an accurate definition of a circular/elliptical orbit through the parameters required in Appendix 4, namely the distance between the perigee or apogee and the centre of the Earth.

**7.1.4 CITEL – Document APG23-6/INF-52**

**Draft Inter-American Proposal (DIAP)**

* Some administrations support Method A2 (Option A) of the draft CPM report on Topic A consisting In specifying tolerances through a new WRC Resolution to be referred to in RR Article **11** and to apply to:
* Option 1: satellites of all non-GSO FSS, BSS or MSS systems (with an eccentricity < 0.5/TBD ) or
* Option 2: satellites of all non-GSO FSS, BSS or MSS systems (either with an eccentricity < 0.5/TBD) and subject to Resolution 35 (WRC-19)

**Preliminary Proposal**

* An Adminitration supports Method A4 of the CPM report on Topic A consisting in addressing tolerances through a new WRC Resolution applicable only to FSS,BSS and MSS systems with circular orbit and subject Resolution 35 and to be referred to in RR Article **11.** This proposed new Resolution calls for periodic reporting for awareness, and for provision of assurances that any deviations in altitude and inclination in circular-orbit non-GSO systems would not result in an increase in interference to or an increase in required protection from other users of the orbital/spectrum resource.

**7.1.5 RCC – Document APG23-6/INF-45**

* Only FSS, MSS or BSS. Only satellite systems with the altitude of the apogee below 15 000 km should be considered.
* Tolerances 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 shall depend on the type of orbit of the space station.
* The regulatory mechanisms for temporarily excess of the established tolerances need to be developed in order to meet the operational requirements of non-GSO systems. No specific Method.

**7.2 International Organisations**

**7.2.1 IARU R3**

* None.

**7.2.2 ICAO**

* None.

**7.2.3 IMO**

* None.

**7.2.4 WMO**

* None.

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1. See WRC-19 Document [CMR19/571 (10th Plenary Minutes)](https://www.itu.int/md/R16-WRC19-C-0571/en), Section 10.5, paragraph 2. [↑](#footnote-ref-1)