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| **The 5th Meeting of the APT Conference Preparatory**  **Group for WRC-19 (APG19-5)** | **APG19-5/OUT-20**  **(Rev.1)** |
| 31 July – 6 August 2019, Tokyo, Japan | 5 August 2019 |

Working Party 3

**APT VIEW AND PRELIMINARY APT COMMON PROPOSAL**

**on WRC-19 agenda item 1.6**

**Agenda Item 1.6:**

*“to consider the development of a regulatory framework for non-GSO FSS satellite systems that 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), in accordance with Resolution* ***159 (WRC-15)****”*

**1. Background**

The principal requirement of this agenda item is to conduct “studies of technical and operational issues and regulatory provisions for the operation of non-GSO FSS satellite systems in the frequency bands 37.5-42.5 GHz (space-to-Earth) and 47.2‑48.9 GHz (limited to feeder links only), 48.9-50.2 GHz and 50.4-51.4 GHz (all Earth-to-space), while ensuring protection of GSO satellite networks in the FSS, MSS and BSS, without limiting or unduly constraining the future development of GSO networks across those bands, and without modifying the provisions of Article **21**”. Protection of EESS (passive) and RAS is also required.

Sharing between Non-GSO and GSO systems

ITU-R studies have shown that in the 50/40 GHz frequency bands, propagation impairments such as rain, cloud and gaseous absorption exist that can substantially affect FSS satellite links. The studies demonstrate that these propagation impairments should be taken into account on both the wanted and interfering paths for sharing analyses in the 50/40 GHz band, noting there is a difference in the attenuation experienced by each path, but it has a limited impact on the total degradation of the link for some specific scenarios.

The objective is to identify means to enable use of these bands by non-GSO systems that will ensure appropriate protection of co-frequency GSO FSS networks, thereby significantly enhancing spectrum use.

Coordination between non-GSO FSS systems

In order to facilitate sharing between non-GSO FSS systems in the frequency bands covered by Resolution **159 (WRC‑15),** the ITU-R should develop a methodology to apply the relevant coordination procedure (No. **9.12)** to facilitate sharing amongst non-GSO FSS systems and to ensure a way to keep track of the aggregate interference from all operating non-GSO systems. ITU-R studies have shown that it may therefore be necessary to apportion this aggregate interference into single entry permissible levels to be met by non-GSO FSS systems, taking into account the mechanisms by which all the interference sources cumulate.

Further, there is a need to provide a regulatory mechanism that would ensure protection of GSO FSS from the maximum aggregate EPFD produced by multiple non-GSO FSS systems. ITU-R studies have indicated that one possible mechanism for meeting this objective, in addition to regulatory sharing mechanisms, is for provisions of coordination between non-GSO satellite systems.

Methods to satisfy the Agenda Item

The Conference Preparatory meeting has identified two issues within the CPM Report for WRC-19 Agenda item 1.6 which can be found in [Document WRC19-/3](https://www.itu.int/dms_pub/itu-r/md/16/wrc19/c/R16-WRC19-C-0003!!MSW-E.docx).

Issue 1 relates to the development of a regulatory framework for the operation of NGSO satellites that 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). One method proposes changes to RR Article **5** and RR Article **22** to address the agenda item. A second method proposes that studies be carried forward.

Issue 2 relates to proposals for revision of Resolution **750 (Rev. WRC-15)** for the protection of EESS (passive) in the band 50.2 – 50.4 GHz. One option proposes revision of limits applicable for NGSO systems only. A second option proposes revision of limits applicable for both GSO and NGSO systems.

Relevant Reports/Recommendations

WP 4A, as the responsible group, has developed the following documents:

* Preliminary draft new Recommendation ITU-R S.[50/40 GHZ FSS SHARING METHODOLOGY] “*Maximum permissible levels of interference in a satellite network (GSO and non-GSO) in the fixed-satellite service caused by other co-directional FSS networks operating in 50/40 GHz frequency band*”, as contained in [Annex 1 to Document 4A/912](https://www.itu.int/dms_ties/itu-r/md/15/wp4a/c/R15-WP4A-C-0912!N01!MSW-E.docx);
* Draft new Report ITU-R S.[50/40 GSO-NGSO SHARING] “*Sharing between 50/40 GHz GSO FSS networks and non-GSO FSS systems*”, as contained in [Document 4/66](https://www.itu.int/dms_ties/itu-r/md/15/sg04/c/R15-SG04-C-0066!R1!MSW-E.docx) (This Report was approved by Study Group 4 on 5 July 2019);
* Working document towards a preliminary draft new Report ITU-R S.[50/40 NGSO-NGSO SHARING] “*Study of mitigation techniques between non-GSO FSS systems in the bands 36-37 GHz and 50.2-50.4 GHz*”, as contained in [Annex 19 to Document 4A/912](https://www.itu.int/dms_ties/itu-r/md/15/wp4a/c/R15-WP4A-C-0912!N19!MSW-E.docx);
* Preliminary draft new Report ITU-R S.[50/40 GHz ADJACENT BAND STUDIES] “*Protection of EESS (passive) and RAS systems from non-GSO satellite systems operating in the 37.5-42.5 GHz, 47.2 50.2 GHz and 50.4-51.4 GHz frequency bands under WRC-19 agenda Item 1.6*”, as contained in [Annex 6 to Document 4A/912](https://www.itu.int/dms_ties/itu-r/md/15/wp4a/c/R15-WP4A-C-0912!N06!MSW-E.docx);
* Working document towards a preliminary draft new Recommendation ITU-R S.[50/40 Reference Links] “*Satellite system characteristics to be considered in frequency sharing analyses within the fixed-satellite service 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*”, as contained in [Annex 9 to Document 4A/912](https://www.itu.int/dms_ties/itu-r/md/15/wp4a/c/R15-WP4A-C-0912!N09!MSW-E.docx).

**2. Documents**

Input Documents:

APG19-5/INP-18R1 (NZL), INP-44R1 (AUS), INP-51 (INS), INP-58 (SNG), INP-67 (CHN), INP-81 (JPN), INP-100 (THA), INP-113 (MLA), INP-119 (VTN), INP-129 (KOR)

Information Documents:

APG19-5/INF-01 (WMO), INF-17 (Boeing, Australia), INF-18 (CEPT), INF-19 (ATU), INF-20 (CITEL), INF-22 (RCC)

**3. Summary of discussions**

**3.1 Summary of APT Members’ views**

**3.1.1 New Zealand** - **Document APG19-5/INP-18R1**

New Zealand supports the conclusions of ITU-R studies in developing technical conditions in Article **22** to better facilitate co-frequency operation of GSO and non-GSO networks within the frequency bands 37.5-42.5 GHz (space-to-Earth), 47.2-50.2 GHz (Earth-to-space) and 50.4-51.4 GHz. The methods are similar, however New Zealand supports Method A to address issue 1 of WRC-19 Agenda item 1.6 as it includes a proposal for monitoring and protecting GSO networks from the aggregate effects of non-GSO systems. In relation to Issue 2 relating to possible modifications to Resolution **750 (Rev. WRC-15)**, New Zealand supports Option A.

In the absence of suitable ITU-R Recommendations able to be incorporated by reference, New Zealand supports consideration of a new Resolution containing generic GSO Reference Links and calculation procedures, to be used to verify the compliance of non-GSO systems with single-entry and aggregate limits.

**3.1.2 Australia – Document APG19-5/INP-44R1**

Australia supports establishment of a regulatory and procedural framework to accommodate non-GSO FSS satellite 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), in accordance with Resolution **159 (WRC-15)**.

Australia supports Method A of the CPM Report to WRC-19. Method A proposes two new RR footnotes **5.A16** and **5.A16B** with various options for each. Australia has yet to decide on a preferred option for each footnote and will consider further progress in ITU-R WP 4A on this issue.

In relation to the protection of GSO networks, Australia notes ITU-R studies concluding that implementation of epfd limits may result in spectrum inefficiencies. Regulation aimed at limiting the aggregate impact from NGSO systems to a maximum allowable capacity and availability loss is a practical alternative approach for achieving the required protection of GSO networks. To this extent Australia supports progressing work in ITU-R WP 4A on new Recommendation ITU-R S.[50/40 GHz Sharing Methodology] using the statistics of degradations due to the non-GSO system interference and the influence of fading from the latest versions of Recommendations ITU-R S.1503 and P.618, respectively.

In relation to the protection of EESS (passive) in the adjacent band, Australia notes ITU-R studies indicating that the current limits in Resolution **750 (Rev.WRC-15)** are insufficient. Australia supports a strengthening of those limits but only to the extent deemed essential for protection of the passive service. In relation to the protection of RAS Australia notes the information now contained in a Draft New Report ITU-R S.[50/40 GHz ADJACENT BAND STUDIES].

Australia has yet to decide on a preferred Option in respect of revision of Resolution **750 (Rev.WRC-15)** or what limits might be applicable and an appropriate time-frame for revisions to come into effect.

Australia does not propose a Preliminary APT Common Proposal for this issue.

**3.1.3 Indonesia – Document APG19-5/INP-51**

Issue 1**:** Developing a regulatory framework for non-GSO FSS satellite systems that 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).

Indonesia is of the view to support Method B which proposes to carry forward the studies to ensure the protection of GSO satellite networks under WRC-19 agenda item 1.6 to a new WRC-23 agenda item towards the development of epfd limits.

Issue 2: Modifying Resolution 750 (Rev.WRC-15)

Indonesia is of the view that modifications to Resolution **750 (Rev.WRC-15)** for GSO networks are not within the scope of this agenda item, since Resolution **159 (WRC-15)** calls for studies of technical operational issues and regulatory provisions on non-GSO FSS systems. Hence, Indonesia support Option A which proposes revision of non-GSO limits in Resolution **750 (Rev.WRC-15)**

**3.1.4 Singapore – Document APG19-5/INP-58**

In order to provide regulatory certainty along with the appropriate technical conditions which will facilitate the operations of non-GSO satellite systems in the frequency bands of 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), Singapore supports Method A of Issue 1.

Concerning Issue 2, Singapore supports Option A as we are of the view that there should not be any modification to the limits for GSO networks in Resolution **750 (Rev.WRC-15)** since this is outside the scope of Agenda Item 1.6.

**3.1.5 China – Document APG19-5/INP-67**

To protected GSO satellite networks in the FSS, MSS and BSS from NGSO satellite networks in FSS, based on the CPM report, China supports Method A of Issue 1 which is proposed to add footnotes to RR Article 5 that subjects non-GSO FSS and MSS systems to coordination provisions, add provisions to RR Article 22 in order to protect GSO satellite networks, and establishes a consultation group to coordinate aggregate interference in order to protect GSO satellite networks in this study circle.

To ensure the protection of the EESS (passive) and RAS, China also supports Method B of Issue 2 which revised of limits for both GSO networks and non-GSO systems in Resolution **750 (Rev.WRC-15).**

We propose that the above views will be the PACP under WRC-19 agenda item 1.6.

**3.1.6 Japan – Document APG19-5/INP-81**

Japan is of the view that existing services should be adequately protected, and additional restrictions should not be imposed on existing services.

**3.1.7 Thailand – Document APG19-5/INP-100**

Thailand is of the view that GSO satellite networks in FSS, MSS and BSS, and other existing primary services 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) should be protected from non-GSO FSS satellite systems in the same bands under the development as well as protection of the EESS (passive) in the frequency bands 36-37 GHz and 50.2-50.4 GHz and the radio astronomy in the frequency bands 42.5-43.5 GHz, 48.94-49.04 GHz and 51.4-54.25 GHz.

**3.1.8 Malaysia – Document APG19-5/INP-113**

In principle, Malaysia supports development of regulatory framework for non-GSO FSS satellite systems that may operate in the 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) frequency bands while ensuring protection of existing services in the same and adjacent frequency bands.

Issue 1: Development of regulatory framework for non-GSO FSS satellite systems:

Malaysia is of the view that development of regulatory framework for non-GSO FSS satellite systems that may operate in 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) frequency bands should ensure protection of existing services to which these bands are allocated.

Issue 2: Modification of Resolution **750 (Rev.WRC-15)**:

Malaysia supports Option A which proposes revision of limits only for non-GSO systems as modifications to Resolution **750 (WRC-15)** for GSO networks are not within the scope of this agenda item.

**3.1.9 Vietnam – Document APG19-5/INP-119**

Because of no conclusion on the appropriate epfd limits to protect GSO FSS and BSS networks from the operation of non-GSO FSS systems, Vietnam supports the method B of issue 1 to carry forward the studies to ensure the protection of GSO satellite networks under WRC-19 agenda item 1.6 to a new WRC‑23 agenda item towards the development of epfd limits.

**3.1.10 Korea (Rep of) – Document APG19-5/INP-129**

For Issue 1, the Republic of Korea was of the view that Method A in the CPM Report would be acceptable in order to develop a regulatory framework for non-GSO FSS satellite systems that 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). However, it should be noted that this Method may be no longer valid due to the fact that ITU-R has not completed development of the relevant ITU-R Recommendations which were supposed to be incorporated by references for implementation of this Method. Due to lack of time for development and consideration of alternative method to satisfy the agenda item, the Republic of Korea is of the view that it would be unable to develop any APT common proposals on this issue at this meeting (APG19-5).

For Issue 2, the Republic of Korea supports Option A, since the allocation to the EESS (passive) in the band 50.2-50.4 GHz should not impose undue constraints on the use of the adjacent bands by the primary allocated services including FSS in those bands in accordance with RR No. **5.340.1** and modifications to Resolution **750 (Rev.WRC-15)** for GSO FSS satellite networks are not within the scope of this agenda item due to the explicit call of Resolution **159 (WRC-15)** to study technical operational issues and regulatory provisions on non-GSO FSS systems.

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

In relation to Issue 2 relating to possible modifications to Resolution **750 (Rev. WRC-15)**, some APT Members support Option B as protection of EESS (passive) is required from both non-GSO and GSO satellite systems.

Some APT Members believe it is premature to identify an option in relation to Issue 2 and APT Members are encouraged to consider the options and contribute to WRC-19 as appropriate.

**4. APT View(s)**

APT Members support the establishment of regulatory and procedural conditions for non-GSO FSS satellite 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) while ensuring protection to GSO satellite networks in FSS, MSS and BSS, and other existing primary services in the same bands as well as protection of the EESS (passive) in the frequency bands 36-37 GHz and 50.2-50.4 GHz and the radio astronomy in the frequency bands 42.5-43.5 GHz, 48.94-49.04 GHz and 51.4-54.25 GHz.

APT Members support Method A of Issue 1 in the CPM Report.

In the absence of suitable ITU-R Recommendations to be incorporated by reference, APT Members support consideration of WRC Resolutions, addressing:

* generic GSO Reference Links and calculation procedures, that may be used to verify the compliance of non-GSO systems; and
* regulatory provisions to protect GSO satellite networks based on appropriate sharing methodology and reference characteristics of GSO satellite networks.

APT Members support ensuring the protection of EESS (passive) from unwanted emission in adjacent bands. In relation to Issue 2 relating to possible modifications to Resolution **750 (Rev. WRC-15)**, preference towards Option A has been expressed, and Option B is still under consideration.

**5. Preliminary APT Common Proposal(s)**

