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| **The 5th Meeting of the APT Conference Preparatory****Group for WRC-19 (APG19-5)** | **APG19-5/OUT-34****(Rev.1)** |
| 31 July – 6 August 2019, Tokyo, Japan | 5 August 2019 |

Working Party 2

**APT VIEW AND PRELIMINARY APT COMMON PROPOSAL**

**on WRC-19 agenda item 9.1 (ISSUE 9.1.1)**

**Agenda Item 9** *to consider and approve the Report of the Director of the Radiocommunication Bureau, in accordance with* ***Article 7*** *of the Convention:*

**9.1.** *on the activities of the Radiocommunication Sector since WRC-15;*

**Issue 9.1.1: Resolution 212 (Rev.WRC-15)**

*Implementation of International Mobile Telecommunications in the frequency bands 1 885-2 025 MHz and 2 110 -2 200 MHz*

**1. Background**

Resolution **212 (Rev. WRC-15)** invites the ITU-R to study possible technical and operational measures to ensure coexistence and compatibility between the terrestrial component of IMT (in the mobile service) and the satellite component of IMT (in the mobile service and the mobile-satellite service) in the frequency bands 1 980–2 010 MHz and 2 170–2 200 MHz where those frequency bands are shared by the mobile service and the mobile-satellite service in different countries, in particular for the deployment of independent satellite and terrestrial components of IMT and to facilitate development of both the satellite and terrestrial components of IMT.

The terrestrial component of IMT has already been deployed or is being considered for deployment in the frequency bands 1 885–1 980 MHz, 2 010–2 025 MHz and 2 110–2 170 MHz. Both the terrestrial and satellite components of IMT have already been deployed or are being considered for deployment in the frequency bands 1 980–2 010 MHz and 2 170–2 200 MHz.

It was noted that co-frequency deployment of independent satellite and terrestrial IMT components in the same geographical area is not feasible unless technique, such as the use of an appropriate guardband or other mitigation techniques are applied to ensure coexistence and compatibility between the terrestrial and satellite components of IMT.

It was also noted that satellite and terrestrial IMT components deployed in adjacent geographical areas might require technical and operational measures to avoid harmful interference between them.

Within ITU-R, Working Party (WP) 4C and WP 5D which are responsible for the studies, have jointly developed the working document towards a preliminary draft new Report ITU-R M.[MSS&IMT-ADVANCED SHARING]. This working document provides the ITU-R studies conducted in the frequency bands 1 980–2 010 MHz and 2 170–2 200 MHz for the co-existence and the compatibility between the satellite component of IMT and terrestrial component of IMT in adjacent geographical areas across different countries.

The following four potential interference scenarios have been considered in the sharing studies:

* Interference from IMT base stations (BSs) and IMT user equipment (UE) to IMT space stations (Scenario A1);
* Interference from IMT BSs to IMT mobile earth stations (MESs) (Scenario A2);
* Interference from IMT MESs to IMT BSs and IMT UEs (Scenario B1);
* Interference from IMT space stations to IMT UEs (Scenario B2).

For the satellite component of IMT, the technical and operational characteristics used in the studies are based on the specifications from Recommendation ITU-R M.1850-2. It should be noted that some parameters used in the studies (e.g. bandwidth and satellite e.i.r.p.) are different from those currently in Recommendation ITU-R M.1850-2, as a consequence of technical development of the satellite component of IMT. The use of these parameters is still being studied in ITU-R. However, those differences do not affect the conclusions of the calculations in Scenarios A1 and A2.

The parameters for the terrestrial component of IMT used in the studies are based on Report ITU-RM.2292-0, and the methodology for modeling and simulating the terrestrial IMT network is given in Recommendation ITU-R M.2101-0. It should be noted that in addition to the values specified in Report ITU-R M.2292-0, one study employed different values for some of the parameters (noise figure, antenna gain and body loss), as a consequence of technical development of the terrestrial component of IMT, such as Machine Type Communication (MTC) as contained in Recommendation ITU-R M.2012-3. The use of these assumed IMT MTC UE parameters, which are still being studied in ITU-R, resulted in different conclusions from those results for IMT UEs related to the scenario of potential interference from IMT space stations into terrestrial receivers.

The protection criterion for IMT-Advanced is provided in Report ITU-R M.2292-0 as *I/N* = −6 dB. Additional studies were performed by ITU-R with the protection criterion of *I/N* = −10 dB in order to assess the impact of lower *I/N* values on the compatibility between the satellite and terrestrial components of IMT operating in neighboring countries. The recommended frequency arrangements for terrestrial IMT are contained in Recommendation ITU-R M.1036-5.

Chapter 2 of the CPM Report to WRC-19 provides results of ITU-R studies for above four interference scenarios and summarized expressed two multi-item views in which ‘View 1’ presents seven items on regulatory changes including options for scenarios A1, B1 and B2, while ‘View 2’ items withdraw any regulatory changes based on framework of WRC Resolution **212 (Rev.WRC-15)** restricting studies to possible technical and operational measures.

It is noted that detail work of WP5D on deliverables related to WRC-19 issues 9.1.1 was suspended following consideration of liaison statements received from WP 4C since this liaison advised that this group foresee studies under their responsibility continuing on the topic “working document towards a preliminary draft new Report ITU-R M.[MSS&IMT-ADVANCED SHARING]” in the new study cycle following WRC-19 ([CHAPTER 4](https://www.itu.int/dms_ties/itu-r/md/15/wp5d/c/R15-WP5D-C-1297%21H04%21MSW-E.docx) to WP 5D chairman Report in 32nd meeting). The latest draft text is available in ([CHAPTER 4](https://www.itu.int/dms_ties/itu-r/md/15/wp5d/c/R15-WP5D-C-1184%21H04%21MSW-E.docx) to WP 5D chairman Report in 31st meeting).

**2. Documents**

* APG19-5/INP-17 (NZL), 23 (NZL), 37 (IRN), 43 (AUS), 56 (PNG), 66 (CHN), 79 (JPN, KOR, SNG), 80 (J), 94 (LAO), 99 (THA), 112 (MLA), 118 (VTN), 134 (IND)
* APG19-5/INF-18 (CEPT), 19 (ATU), 20 (CITEL), 22 (RCC)

**3. Summary of discussions**

**3.1 Summary of APT Members’ views**

**3.1.1 New Zealand** - **Document APG19-5/INP-17**

New Zealand supports no change to Volumes 1 & 2 of the Radio Regulations. Since the Radio Regulations did not establish priority neither between terrestrial and satellite components of IMT, nor between mobile and mobile-satellite services in the bands 1 980-2 010 MHz/2 170-2 200 MHz, New Zealand is currently of the view that potential interference for all four possible scenarios between these services could be managed by bilateral/multilateral negotiation where administrations can bilaterally/multilaterally determine the appropriate mitigation techniques on a case-by-case basis.

**3.1.2 New Zealand** - **Document APG19-5/INP-23**

This contribution is developed in line with the position of No Change (NOC) to Volumes 1, 2 and 4 of the ITU Radio Regulations. Taking into account this position, it is proposed that only Resolution **212 (Rev.WRC-15)** should be updated.

The detailed proposals for the revision of Resolution **212 (Rev.WRC-15)** can be found in the ANNEX to this contribution.



**3.1.3 Iran (Islamic Republic of)** - **Document APG19-5/INP-37**

This administration has a view that the result of ITU-R study should not have regulatory implication, due to framework of this agenda item in Resolution **212** (**Rev. WRC-15**) which is clearly limited to the study of possible technical and operational measures.

In respect to the above four interference scenarios, this administration has a view that mitigation techniques with the aid of bilateral/multilateral arrangements of concerned administrations suffice for resolving interference.

**3.1.4 Australia** - **Document APG19-5/INP-43**

Australia supports development of appropriate technical and operational measures to ensure coexistence and compatibility between the terrestrial component of IMT (in the mobile service) and the satellite component of IMT (in the mobile service and the mobile-satellite service) in the frequency bands 1 980- 2 010 MHz and 2 170-2 200 MHz in accordance with Resolution **212 (Rev.WRC-15).**

Outcomes on this Issue should result in no change to the Radio Regulations. This Issue may be addressed by appropriate technical and operational measures in new or revised ITU-R Recommendations or Reports.

Australia proposes a Preliminary APT Common Proposal for NOC as follows:



**3.1.5 Papua New Guinea** - **Document APG19-5/INP-56**

The Administration of Papua New Guinea supports View 1 in the CPM 19-2 Report and proposes taking the following actions to ensure long-term sharing by terrestrial IMT and satellite IMT of the frequency bands 1 980-2 010 MHz/2 170-2 200 MHz:

* Adopt a maximum e.i.r.p. limit of 20 dBm/5 MHz on land stations in the mobile service transmitting in the frequency band 1 980‑2 010 MHz to ensure that this band is used as an uplink by both services, with an exception for the 1 980-1 990 MHz band for those countries listed in RR No. 5.389B (Scenario A1).
* Add digital modulation parameters to Appendix **7** (Scenario B1).
* Add a new coordination threshold pfd value for MSS space stations along with a new Note 11 and modify NOTE 3 in Table 5-2 of Appendix **5** (Scenario B2).

Modifications to Resolution **212 (Rev. WRC-15)** to reflect the above are also included.



**3.1.6 China (People’s Republic of)** - **Document APG19-5/INP-66**

The People’s Republic of China supports View 1 of the CPM Report concerning Agenda Item 9.1.1, which will enable both the terrestrial and satellite component of IMT to develop in a manner consistent with Region 3 deployments. The View 2 approach would put the MSS at high risk of being rendered inoperable by interference.

It should be pointed out that there are no provisions in the Radio Regulations to trigger bilateral coordination or to identify the concerned administrations to address interference from IMT BSs into IMT space station in Scenario A1 and from IMT space stations to IMT UEs in Scenario B2. Although several technical and operational mitigation measures were identified in studies, the interference could be only reduced partially, but not wholly eliminated. Therefore, both technical methods and additional regulatory measures should be considered.

View 1 provide a solution to ensure long-term sharing by terrestrial IMT and satellite IMT. Establishment of regulations and coordination procedures could help administrations to deploy their terrestrial or satellite systems and avoid harmful interference.

Based on View 1, China proposes the APT Common Proposal on WRC-19 Agenda Item 9.1.1 as follows:

– Adopt a maximum e.i.r.p. limit of 20 dBm/5 MHz on land stations in the mobile service transmitting in the frequency band 1 980‑2 010 MHz to ensure that this band is used as an uplink by both services, with an exception for the 1 980-1 990 MHz band for those countries listed in RR No. 5.389B (Scenario A1).

– Establish a new coordination threshold pfd value produced at the Earth’s surface by IMT space stations, for instance –108.8 dB(W/(m2) in 1 MHz, to protect terrestrial stations of IMT in the frequency band 2 170-2 200 MHz (Scenario B2).

Modifications to Resolution **212 (Rev. WRC-15)** to reflect the above are also included.



**3.1.7 Japan, Korea (Republic of) and Singapore** - **Document APG19-5/INP-79**

Taking into account the above, No Change (NOC) is proposed for this issue. As a consequence of this, only Resolution **212 (Rev.WRC-15)** should be updated to reflect this conclusion. Detailed proposals for ACP (APT Common Proposal) are shown as follows;



**3.1.8 Japan** - **Document APG19-5/INP-80**

Since issue 9.1.1 is studied under the Resolution **212** (**Rev. WRC-15**), and the modification of the Radio Regulations (RR) is out of scope of this issue, issue 9.1.1 should not study any regulatory changes.

Japan is of the view that no additional provisions to address the coexistence and compatibility should be supported, since the present flexibility of each Administration to apply several mitigation measures identified in ITU-R studies through bilateral/multilateral discussions between administrations should be maintained and no uniform regulatory constraints is required.

Furthermore, though some ITU-R studies proposed the modification of RR, such studies have some problems of using some unrealistic assumptions.

Therefore, since it can be concluded that there are no needs to revise the RR, Japan supports NOC.

Proposal for ACP on issue 9.1.1 is in another Input Document for APG19-5 from Japan, Korea and Singapore.

**3.1.9 Lao PDR** - **Document APG19-5/INP-94**

According to the CPM Report to the WRC-19 and the result of ITU-R studies on WRC-19 agenda item 9.1, issue 9.1.1, there are 2 views were expressed and no conclusion were drawn during the study cycle.

Lao PDR is of the view that the protection of terrestrial IMT operating in the band 1980-2010 MHz and 2170-2200 MHz is required.

**3.1.10 Thailand** - **Document APG19-5/INP-99**

Thailand is of the view that protecting terrestrial components of IMT in the frequency band
1 980 - 2 010 MHz and 2 170 - 2 200 MHz is preferred

However, since there are two different views in the CPM Report and there are no conclusions drawn during the study cycle to justify values/parameters in the proposed regulatory constraints, Thailand supports no modification of the Radio Regulations (RR) regarding this agenda item.

**3.1.11 Malaysia** - **Document APG19-5/INP-112**

Malaysia is of the view that the scope of WRC-19 agenda item 9.1, issue 9.1.1 is limited to the study of possible technical and operational measures to ensure coexistence and compatibility between the terrestrial component of IMT and the satellite component of IMT in the frequency bands 1 980-2 010 MHz and 2 170-2 200 MHz in different countries, in accordance with Resolution **212 (Rev.WRC-15)**. Therefore, regulatory measures or any changes to the Radio Regulations are outside the scope of WRC-19 agenda item 9.1 issue 9.1.1.

 Malaysia is of the view that bilateral/multilateral discussions between different administrations provide greater operational flexibility while ensuring coexistence between the two components deployed in different countries.

**3.1.12 Viet Nam (Socialist Republic of)** - **Document APG19-5/INP-118**

Viet Nam supports adequate measures to ensure the compatibility and co-existence of the satellite and terrestrial components of IMT, taking into account that the bands 1980-2010 MHz and 2170-2200 MHz are prioritized for IMT terrestrial component in some countries.

Study results from ITU-R Study Groups shows that potential interferences in scenario A2 (IMT BS to MES) and B1 (MES to IMT system) can be addressed by relevant provisions on border coordination which currently contained in the Radio Regulations (e.g. Article 9, Appendix 7).

Viet Nam support the principle from View 1 (not the whole View 1 itself, in particular the emission limits in scenario A1 and B2 need further assessment) in the CPM Report, to stipulate practical coordination threshold values to address potential interference in scenario A1 (IMT BS to SS) and B2 (SS to IMT system), in order to avoid unnecessary coordination and facilitate the development of IMT terrestrial system.

**3.1.13 India (Republic of)** - **Document APG19-5/INP-134**

Interference to space station under MSS is required to be address. Since there is no provision in the Radio Regulations, to resolve it, India support View1.

View 1:

View 1 is based on Resolution ITU-R 2-7 *resolves* 2: “*that the scope of CPM shall be to prepare a consolidated report to be used in support of the work for World Radiocommunication Conferences, based on: the inclusion, to the extent possible, of reconciled differences in approaches as contained in the source material, or, in the case where the approaches cannot be reconciled, the inclusion of the differing views and their justification*”.

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

During three sessions of Drafting Group 9.1 issue 9.1.1 (DG9.1.1) following issues raised:

1. Status of ITU-R studies:
For the last four years since WRC-15, ITU-R WP 4C and WP 5D have conducted studies, the current status of which is documented in the working document towards a preliminary draft new Report ITU-R M.[MSS&IMT-ADVANCED SHARING] – “Coexistence and compatibility study between the terrestrial component and the satellite component of IMT in the frequency bands 1 980-2 010 MHz and 2 170-2 200 MHz in different countries.” Due to time constrains, the Report has not been thoroughly reviewed. Therefore WP 4C and WP 5D decided to carry it forward to the next their meetings in the new study cycle following WRC-19;
2. Divergent views of APT members:
Based on input documents to the APG19-5 meeting for the issue 9.1.1 of agenda item 9.1, and also based on the expressed views in the CPM Report, there are two divergent views as following:
	* Some APT members are of view that since the Resolution **212 (Rev.WRC-15)** strictly limits the scope of relevant ITU-R studies to possible technical and operational measures to ensure coexistence and compatibility between the terrestrial component of IMT and the satellite component of IMT in the frequency bands 1 980-2 010 MHz and 2 170-2 200 MHz in different concerned countries. Therefore regulatory measures or any changes to the Radio Regulations Volumes 1, 2 and 4 are outside the scope of WRC-19 agenda item 9.1 issue 9.1.1. These APT members are also of the view that the result of certain studies have shown that there are multiple technical and operational measures which can be implemented, the combination of bilateral/multilateral negotiation and the current provisions of Radio Regulations is the appropriate approach for resolving potential interference between the terrestrial component of IMT and the satellite component of IMT.
	* Some other APT members are of view that WRC-19 should take action to ensure coexistence and compatibility to resolve potential interference between the terrestrial component of IMT and the satellite component of IMT in the frequency bands 1 980-2 010 MHz and 2 170-2 200 MHz in different countries, particularly for Scenario A1 where the level of potential interference from IMT BS into IMT space stations in the frequency band 1 980-2 010 MHz is high and there is no coordination procedure in the Radio Regulations. If the band 1 980-2 010 MHz is used by both satellite and terrestrial component of IMT as an uplink, the interference is manageable. These APT members proposed to modify Resolution 212 (Rev. WRC-15) to add a maximum e.i.r.p. limit of 20 dBm/5 MHz on land stations in the mobile service transmitting in the frequency band 1 980‑2 010 MHz to ensure that this band is used as an uplink by both services, with an exception for the 1 980-1 990 MHz band for those countries listed in RR No. 5.389B (Scenario A1). Some proposals also included the following elements:
* Add digital modulation parameters to Appendix **7** or alternatively to Resolution 212 (Scenario B1).
* Add a new coordination threshold pfd value for MSS space stations along with a new Note 11 and modify NOTE 3 in Table 5-2 of RR Appendix **5** (Scenario B2).

In an effort to find consensus and provide an operational solution for Scenario A1, these administrations proposed an alternative modification to the *resolves* of Resolution **212 (Rev. WRC-15)** to limit the use of the frequency band 1 980-2 010 MHz by the terrestrial component of IMT to transmissions from user equipment to base stations.

Accordingly, drafting group was not successful in development of preliminary APT common proposal, despite to endeavoring highest effort to achieve consensus on a midway proposal.

**4. APT View(s)**

APT Members recognize the ITU-R studies on possible technical and operational measures to ensure coexistence and compatibility between the terrestrial component of IMT (in the mobile service) and the satellite component of IMT (in the mobile service and the mobile-satellite service) in the frequency bands 1 980–2 010 MHz and 2 170–2 200 MHz in different countries, in accordance with Resolution **212 (Rev.WRC-15)**.

With respect to the regulatory actions and associated views, while there was more supports for View 2 as contained in the CPM Report according to the input documents, however no consensus was reached on either of these two Views.

In view of the above, no consensus was reached on any action to be taken in regard with WRC-19 agenda item 9.1 issue 9.1.1 consequently no PACP is agreed at this stage.

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

None