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|  | ASIA-PACIFIC TELECOMMUNITY | Document No: |
| **The 4th Meeting of the APT Conference Preparatory****Group for WRC-19 (APG19-4)** | **APG19-4/OUT-24****(Rev.1)** |
| 7 – 12 January 2019, Busan, Republic of Korea | 12 January 2019 |

Working Party 2

**PRELIMINARY VIEWs 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, WP 4C and WP 5D which are responsible for the studies, have jointly developed the working document towards a preliminary draft new [Recommendation/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. 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, 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-R M.2292, and the methodology for modelling and simulating the terrestrial IMT network is given in Recommendation ITU-R M.2101. It should be noted that in addition to the values specified in Report ITU-R M.2292, 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. 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 working document will be further updated at the next meeting of WP 5D (Meeting #31*bis* in February 2019). The latest progress of the work will then be liaised to WP 4C from that meeting. This is then expected to be finalized at the WP 5D Meeting #32 in July 2019.

1. **Documents**
* Input Documents:
[APG19-4](https://www.apt.int/2019-APG19-4)/[INP-16 (AUS)](https://www.apt.int/sites/default/files/2019/01/APG19-4-INP-16__AUS2_-_Australian_Contribution_to_APG19-4_Chapter_2.docx), [INP-23 (NZL)](https://www.apt.int/sites/default/files/2018/12/APG19-4-INP-23_NZ2_WP2.docx), [INP-35 (LAO, THA)](https://www.apt.int/sites/default/files/2018/12/APG19-4-INP-35_THAI_LAO__PDR-Thailand_AI_9.1.1.doc), [INP-38 (VTN)](https://www.apt.int/sites/default/files/2018/12/APG19-4-INP-38_Vietnam_WP2_1.13_1.16.docx), [INP-60 (JPN)](https://www.apt.int/sites/default/files/2018/12/APG19-4-INP-60_2_J_WP2.docx), [INP-75(Rev.1) (KOR)](https://www.apt.int/sites/default/files/2018/12/APG19-4-INP-75_WP2_kor_Rev.1.docx), [INP-84 (IRN)](https://www.apt.int/sites/default/files/2018/12/APG19-4-INP-84_IRN_Chapter_2.docx), [INP-91 (SNG)](https://www.apt.int/sites/default/files/2019/01/APG19-4-INP-91_WP2_Singapore_1.13_1.16_9.1.1.docx), [INP-101 (CHN)](https://www.apt.int/sites/default/files/2018/12/APG19-4-INP-101_China5_Preliminary_views_on_WRC-19_AI_1.13_1.16_9.1_issues_9.1.1_9.1.5_9.1.8_rev_3.docx), [INP-104 (CHN)](https://www.apt.int/sites/default/files/2018/12/APG19-4-INP-104_China8_Proposed_Modification_to_the_Chapter_2_of_the_Draft_CPM_Report_rev2.docx), [INP-109 (BGD)](https://www.apt.int/sites/default/files/2018/12/APG19-4-INP-109_BGD_WP2.docx)
* Information Documents:
[APG19-4](https://www.apt.int/2019-APG19-4)/INF-22 (CITEL), [INF-23](https://www.apt.int/sites/default/files/2019/01/APG19-4-INF-23_CEPT_PPT.pdf) (CEPT), [INF-24](https://www.apt.int/sites/default/files/2019/01/APG19-4-INF-24_RCC.pdf) (RCC), [INF-26](https://www.apt.int/sites/default/files/2019/01/APG19-4-INF-26_NPL_AI_1.13_1.16_AND_9.1.1.docx) (Nepal), [INP-09(Rev.1)](https://www.apt.int/sites/default/files/2018/12/APG19-4-INP-09Rev.1_Report-second_Inter-regional_Workshop_on_preparations_for_WRC-19.docx) (ASMG)
1. **Summary of Discussions**
	1. **Summary of APT Members’ view**
		1. **Australia - Document** [**APG19-4/INP-16**](https://www.apt.int/sites/default/files/2019/01/APG19-4-INP-16__AUS2_-_Australian_Contribution_to_APG19-4_Chapter_2.docx)

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)**.

Australia is of the view that any outcome of this Issue should not result in any changes to the Radio Regulations. Australia is further of the view that this Issue may be addressed by appropriate technical and operational measures in new or revised ITU-R Recommendations or Reports.

* + 1. **New Zealand - Document** [**APG19-4/INP-23**](https://www.apt.int/sites/default/files/2018/12/APG19-4-INP-23_NZ2_WP2.docx)

New Zealand supports no change to 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.

* + 1. **Thailand and Lao PDR - Document** [**APG19-4/INP-35**](https://www.apt.int/sites/default/files/2018/12/APG19-4-INP-35_THAI_LAO__PDR-Thailand_AI_9.1.1.doc)

Lao PDR and Thailand support the continuation of ITU-R Working Party 5D study on the technical and operational measures to ensure coexistence and compatibility between the satellite and terrestrial components of IMT in the frequency bands 1 980–2 010 MHz and 2 170–2 200 MHz.

The final result of ITU-R study on this issue should provide a single solution to reflect both IMT UE and IMT MTC receivers’ protection criteria.

Since there is no existing satellite component of IMT, Lao PDR and Thailand are of the view that the protection of terrestrial IMT operating in the frequency band 1 980–2 010 MHz and 2 170–2 200 MHz is required.

* + 1. **Viet Nam (Socialist Republic of) - Document** [**APG19-4/INP-38**](https://www.apt.int/sites/default/files/2018/12/APG19-4-INP-38_Vietnam_WP2_1.13_1.16.docx)

This Administration supports studies done by ITU-R Working Party 4C and 5D within Resolution **212 (Rev. WRC-15)**, including studies to evaluate the coexistence and compatibility of terrestrial and satellite components of IMT deployed in neighbouring countries;

Terrestrial component of IMT in these bands is preferred and need to be protected.

* + 1. **Japan - Document** [**APG19-4/INP-60**](https://www.apt.int/sites/default/files/2018/12/APG19-4-INP-60_2_J_WP2.docx)

Japan proposes following preliminary views for APT members:

APT members supports conducting ITU-R studies on 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)**.

APT has a view that no modification of the Radio Regulations (RR) which stipulate additional provisions to address the coexistence and compatibility should be supported, since ITU-R studies showed that several mitigation measures exist and any new provisions to the RR would limit the present flexibility of each Administration for deployments of either terrestrial or satellite components of IMT.

* + 1. **Korea (Rep. of) - Document** [**APG19-4/INP-75(Rev.1)**](https://www.apt.int/sites/default/files/2018/12/APG19-4-INP-75_WP2_kor_Rev.1.docx)

The Republic of Korea is of the view that considering the scope of the WRC-19 agenda item 9.1, issue 9.1.1, limited to performing the study of technical and operational measures; it does not call for any regulatory studies or changes to the Radio Regulation.

The Republic of Korea is also of the view that the studies of technical and operational measures show that coexistence and compatibility is possible between terrestrial and satellite components of IMT. Moreover, the studies show wide variation in the potential of interference between the two because of the unique and varying system characteristics and deployment scenarios of the satellite and terrestrial components of IMT in neighbouring countries.

Therefore, bilateral discussions between affected administrations provides greater operational flexibility and ensures efficient utilization of the spectrum for IMT while ensuring coexistence between the two components deployed in neighbouring countries. No further regulatory studies or actions on either service based on worst-case scenario are required within ITU-R.

* + 1. **Iran (Islamic Republic of) - Document** [**APG19-4/INP-84**](https://www.apt.int/sites/default/files/2018/12/APG19-4-INP-84_IRN_Chapter_2.docx)

This Administration supports ITU-R studies on this agenda item and is of the view that the resolution of interference scenarios could be managed by bilateral/multilateral negotiation of neighbor countries under current regulatory practice within ITU-R.

* + 1. **Singapore - Document** [**APG19-4/INP-91**](https://www.apt.int/sites/default/files/2018/12/WP2_APG19-4-INP-91_Singapore_1.13_1.16_9.1.1.docx)

Singapore supports appropriate studies on the technical and operational measures to ensure coexistence and compatibility between the satellite and terrestrial components of IMT in the frequency bands 1 980–2 010 MHz and 2 170–2 200 MHz. Interference mitigation measures may be required to ensure that the operation of one service in any particular country should not constrain the operation of the other service in other countries. Singapore will consider the possible need for revisions to the Radio Regulations to ensure coexistence in the frequency bands 1 980–2 010 MHz and 2 170–2 200 MHz.

* + 1. **China - Document** [**APG19-4/INP-101**](https://www.apt.int/sites/default/files/2018/12/APG19-4-INP-101_China5_Preliminary_views_on_WRC-19_AI_1.13_1.16_9.1_issues_9.1.1_9.1.5_9.1.8_rev_3.docx)

The People’s Republic of China supports to conduct ITU-R studies on 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.

* Relevant ITU-R Recommendations or Reports should be adopted to facilitate the compatibility and co-existence between satellite and terrestrial components of IMT.
* Preliminary results of sharing study show that potential harmful interference would occur from terrestrial IMT BSs into satellites in the band 1 980–2 010 MHz and also from satellites into terrestrial IMT UEs in the band 2 170–2 200 MHz. Therefore, technical and operational measures should be taken by both terrestrial and satellite components of IMT to ensure coexistence and compatibility. The proposed measures in draft CPM report are necessary to be reviewed by ITU-R, in particular the extent to which such measures could address the interference issue, and the values as well as the appropriateness or otherwise of combination of both satellite and terrestrial mitigation measures may be considered are yet to be verified and agreed upon.
* Due to the availability and feasibility of technical and operational measurements under Agenda Item 9.1 Issue 9.1.1, China support to conduct proper frequency arrangements and introduce appropriate modifications to RR Appendices 5 and 7 to identify coordination thresholds between satellite and terrestrial components of IMT in the frequency bands under consideration in WRC-19.

 Based on the above, China proposes to make some modifications on APT Preliminary View(s) as stated below:

1. APT Members supports conducting ITU-R studies on 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)**. Relevant ITU-R Recommendations or Reports should be adopted to facilitate the compatibility and co-existence between satellite and terrestrial components of IMT.
	* 1. **Bangladesh - Document** [**APG19-4/INP-109**](https://www.apt.int/sites/default/files/2018/12/APG19-4-INP-109_BGD_WP2.docx)

Bangladesh supports conducting ITU-R studies on 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).**

The measures should be carefully studied in order to provide flexible and implementable solutions by taking into account actual and realistic system characteristics/conditions rather than the worst-case characteristics/conditions only. It is important to avoid applying a unitary solution based on the worst-case interference conditions, especially to the actual and realistic interference case.

Bangladesh is of the view that the proposed interference mitigation techniques in draft CPM text and recommendation/report for space component IMT, should be feasible due to the current technological advancement.

* + 1. **Nepal – Document** [**APG19-4/INF-26**](https://www.apt.int/sites/default/files/2019/01/APG19-4-INF-26_NPL_AI_1.13_1.16_AND_9.1.1.docx)

Nepal supports ITU-R studies regarding 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.

* 1. **Summary of issues raised during the meeting**

Meeting recognized that ITU-R is still conducting study 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 accordance with the provisions of Resolution **212 (Rev.WRC-15)** and the working document towards a preliminary draft new [Recommendation/Report] ITU-R M.[MSS&IMT-ADVANCED SHARING], which contains the result of studies, will be further updated at the next meeting of WP 5D.

Some APT Members expressed the view that these measures should be carefully studied in order to provide flexible and implementable solutions by taking into account actual and realistic system characteristics/conditions rather than the worst-case characteristics/conditions only. It is important to avoid applying a unitary solution based on the worst-case interference conditions, especially to the actual and realistic interference case in which less interference levels could be expected.

Some other APT Members expressed the view that some system parameters, as well as deployment and propagation models in current studies, are from ITU-R Recommendations, therefore the study results are preliminary reliable (ITU-R characteristics and conditions have been considered and issues studied by both WP 4C and WP 5D carefully). The technical and operational measures should cover the worse cases in order to ensure coexistence and compatibility while the flexible and implementable solutions could be further considered during the coordination, as appropriate.

1. **APT Preliminary View(s)**

APT Members support conducting 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)**.

**Other View(s)**

Some APT members have a view that 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, the present flexibility of Administrations for deployments of either terrestrial or satellite components of IMT need to be retained and any outcome of this Issue should not result in any changes to the Radio Regulations at WRC-19. 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.

Some APT members have a view that in conduction of ITU-R studies, actual and realistic system characteristics/conditions need to be taken into account rather than the worst-case characteristics/conditions only, and no further regulatory studies or actions on either service based on worst-case scenario are required within ITU-R.

Some APT members have a view that the proposed interference mitigation techniques in draft CPM text and recommendation or report for space component IMT, should be feasible due to the current technological advancement.

Some APT members have a view that the final result of ITU-R study on this issue should provide practical protection criteria for the receivers of IMT UE and IMT MTC.

Some APT members have a view that interference mitigation measures may be required to ensure that the operation of one service in any particular country should not constrain the operation of the other service in other countries. Some APT members will consider the possible need for revisions to the Radio Regulations to ensure coexistence of independent satellite and terrestrial IMT components in the frequency bands 1 980–2 010 MHz and 2 170–2 200 MHz.

Some APT members are of the view that the protection of terrestrial IMT operating in the frequency band 1 980–2 010 MHz and 2 170–2 200 MHz is required.

Some APT members are of view that the compatibility between stations in IMT terrestrial component (in mobile service) and IMT satellite component (in mobile-satellite service) is still under study within the ITU-R and may be ensured by the following measures, subject to the outcome of studies in appropriate manner:

* Conducting proper frequency arrangements in the band 1 980–2 010 MHz;
* Applying current coordination procedure specified in the provisions of RR Article 9 and in the future where appropriate introduce appropriate modifications to the RR Appendices 5 and 7, subject to the outcome of studies in the WRC-19 study-cycle to identify coordination thresholds in the frequency bands under consideration.
1. **Issues for Consideration at Next APG Meeting**

APT Members are encouraged to submit their contributions for APT common proposal for the next APG19 meeting, taking into account progress of ITU-R studies and CPM Report.

1. **Views from Other Organizations**
	1. **Regional Groups**
		1. **ASMG – Document** [**APG19-4/INP-09(Rev.1)**](https://www.apt.int/sites/default/files/2018/12/APG19-4-INP-09Rev.1_Report-second_Inter-regional_Workshop_on_preparations_for_WRC-19.docx)
* Follow up the studies on this issue in the ITU Radio Sector Working Groups and Support technical, operational and procedural measures for IMT systems to ensure compatibility between the terrestrial and satellite components of IMT systems in the frequency bands 1 980–2 010 MHz and 2 170–2 200 MHz.
* Preference for using the terrestrial component of IMT in these bands.
	+ 1. **ATU – Document** [**APG19-4/INP-09(Rev.1)**](https://www.apt.int/sites/default/files/2018/12/APG19-4-INP-09Rev.1_Report-second_Inter-regional_Workshop_on_preparations_for_WRC-19.docx)

No preliminary position on this agenda item yet.

* + 1. **CEPT – Document** [**APG19-4/INF-23**](https://www.apt.int/sites/default/files/2019/01/APG19-4-INF-23_CEPT_PPT.pdf)

CEPT supports adequate measures to ensure the compatibility and co-existence of the satellite and terrestrial components of IMT, taking into account that the bands 1 980–2 010 MHz and 2 170–2 200 MHz are prioritised for MSS (mobile satellite service) use in CEPT (see Decisions ECC/DEC/(06)09, ECC/DEC/(06)10, and European Commission Decision 2007/98/EC) while MSS and MS (mobile service) have co-primary status in the RR.

CEPT is of the view that protection of the MSS uplinks in CEPT countries (Interference scenario A1) is not ensured by the current Radio Regulations (RR). There is currently no provision in the RR that would prevent interference from IMT base stations to IMT space stations and there is no coordination process between the administration responsible for MS and the administration responsible for MSS and no process to identify the concerned administrations. Therefore potential revisions to the RR should be developed at least for Region 1 and 3:

* to ensure that the band 1 980–2 010 MHz is not used for IMT base station transmitters or
* limiting the e.i.r.p. of IMT base stations in the uplink band (1 980–2 010 MHz)

CEPT is of the view that the protection of the terrestrial component of IMT (Interference scenario B2) could be achieved by using the current space station pfd thresholds contained in Table 5-2 of Appendix 5 RR and by removing Note 3 of this table. CEPT is studying a revision of the threshold value, in order to avoid the need of unnecessary coordination by MSS systems with respect to countries which operate terrestrial IMT systems.

* + 1. **CITEL – Document APG19-4/INF-22**

IAP[[1]](#footnote-1) for NOC to Volumes 1 and 2 to not limit the flexibility for deployments by individual countries.

DIAP[[2]](#footnote-2) to modify Res. 212 since studies will be complete by WRC-19 and will document technical and operational measures to promote compatibility between the terrestrial and satellite components of IMT in different countries.

* + 1. **RCC – Document** [**APG19-4/INF-24**](https://www.apt.int/sites/default/files/2019/01/APG19-4-INF-24_RCC.pdf)
* To facilitate compatibility between IMT terrestrial component (in mobile service) and IMT satellite component (in mobile-satellite service) in the frequency bands 1 980–2 010 MHz and 2 170–2 200 MHz, the RCC Administrations support adoption of relevant ITU-R Recommendations and Reports and also relevant regulatory provisions facilitating such compatibility.
* The RCC Administrations are of view that compatibility between IMT terrestrial component (in mobile service) and IMT satellite component (in mobile-satellite service) may be achieved through application of existing provisions of RR Article 9 and introduction of appropriate modifications to RR Appendices 5 and 70 to identify coordination thresholds between stations in mobile and mobile satellite services in the frequency bands under consideration.
* The RCC Administrations support adoption of relevant modifications of RR Appendices 5 and 7, based on the materials of Report ITU-R M.2292.
	1. **International Organizations**
		1. **International Amateur Radio Union (IARU)**

None

* + 1. **International Civil Aviation Organization (ICAO)**

None

* + 1. **World Meteorological Organization (WMO)**

None

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1. : INTER-AMERICAN PROPOSAL (IAP): DIAP supported by at least six Members States (of total 12 member states) and not opposed by more than 50% of the number of supports obtained. [↑](#footnote-ref-1)
2. : DIAP (DRAFT INTER-AMERICAN PROPOSAL): PP (a proposal by a CITEL Member State that has not been supported by another Member State.) that has been supported by at least one other Member State [↑](#footnote-ref-2)