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| **The 5th Meeting of the APT Conference Preparatory**  **Group for WRC-19 (APG19-5)** | **APG19-5/OUT-19** |
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Working Party 3

**APT VIEW AND PRELIMINARY APT COMMON PROPOSAL**

**on WRC-19 agenda item 1.5**

**Agenda Item 1.5:** *to consider the use of the frequency bands 17.7-19.7 GHz (space-to-Earth) and 27.5-29.5 GHz (Earth-to-space) by earth stations in motion communicating with geostationary space stations in the fixed-satellite service and take appropriate action, in accordance with Resolution* ***158 (WRC-15)***

Resolution **158 (WRC-15)**: *Use of the frequency bands 17.7-19.7 GHz (space-to-Earth) and 27.5-29.5 GHz (Earth-to-space) by earth stations in motion communicating with geostationary space stations in the fixed-satellite service*

**1. Background**

Earth stations in motion (ESIM) are earth stations that communicate with GSO FSS space stations but operate on moving platforms such as ships, aircraft and land vehicles. ESIM are intended to provide broadband connectivity.

WRC-15 introduced regulations for ESIM operating in the frequency bands 19.7-20.2 GHz and 29.5-30 GHz, contained in Resolution **156** (**WRC-15**). Resolution **158** (**WRC-15**) invites the ITU‑R to consider the use of the bands 17.7-19.7 GHz and 27.5-29.5 GHz by ESIM and take appropriate actions.

At CPM19-2 in 18-28 Feb, the CPM Report to WRC-19 for agenda item 1.5 was finalized, in which the following two methods have been identified;

**Method A** This method proposes no changes to the RR and suppression of Resolution **158 (WRC-15)**.

**Method B** This method proposes to add a new footnote No. **5.A15** in RR Article **5** and a reference to a new WRC Resolution providing the conditions for the operation of ESIM and protection of the services to which the frequency bands are allocated, and consequential suppression of Resolution **158 (WRC-15)**.

**2. Documents**

* Input Documents APG19-5/ INP-13-Rev.1 (SMO&VUT), INP-18 Rev.1 (NZL), INP-40 (IRN), INP-44 Rev.1 (AUS), INP-67 (CHN), INP-82 (J&KOR&SNG), INP-97 (BRU&THA), INP-113 (MLA), INP129 (KOR)
* Information Documents APG19-5/ INF-09 (GSA), INF-12 (GSMA), 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 Samoa and Vanuatu** - **Document APG19-5/INP-13 Rev.1**

The administrations of Samoa propose that WRC-19 adopt regulatory changes necessary to ensure that all nations can take advantage of all the services and innovations that earth stations in motion (ESIM) can offer. Earth stations in motion (ESIM) will keep the economy moving, facilitating services such as gate-to-gate connectivity on aircraft, greater connectivity on shipping vessels and supporting critical services for countries in Region 3.

**3.1.2 New Zealand**- **Document APG19-5/INP-18 Rev.1**

New Zealand supports the use of different regulatory measures to ensure that the introduction of aeronautical, maritime and land-based earth stations in-motion (ESIM) operating with geostationary fixed satellite service networks would not cause harmful interference and not impose additional constraints to existing space and terrestrial services.

New Zealand has supported the ITU-R studies undertaken in accordance with Resolution **158 (WRC-15)** and considers that these should be completed to ensure ongoing protection of existing space and terrestrial services.

In the frequency band 17.7-19.7 GHz, New Zealand is of the view that ESIM shall not claim protection from terrestrial services in the same band. In the frequency band 27.5-29.5 GHz, New Zealand endorses the use of either power-flux density limits or altitude limit for the operation of aeronautical-ESIM and a minimum distance requirement from the shoreline for the operation of maritime-ESIM as appropriate mandatory measures to be included in a draft new WRC Resolution. Deploying land-ESIM within national boundaries of an administration is largely a national matter. New Zealand currently does not consider the use of land-ESIM in these frequency bands.

**3.1.3 Iran** - **Document APG19-5/INP-40**

Islamic Republic of Iran supports Method A(NOC), Nevertheless we could consider Method B with the text proposed to amend the Draft New Resolution [AI1.5] (WRC-19), including several amendments which are raised at last WP 4A (26 June- 04 July 2019) to help developing the Preliminary APT Common Proposal for WRC-19 (Sharm El-Sheikh, Oct., 2019).

**3.1.4 Australia**- **Document APG19-5/INP-44 Rev.1**

Australia supports development of appropriate technical and operational requirements for earth stations in motion (ESIM) that operate or plan to operate in the frequency bands 17.7-19.7 GHz and 27.5-29.5 GHz, taking into account studies under Resolution **158 (WRC-15)** while ensuring protection of, and not imposing undue constraints on, services already allocated in the frequency bands.

ITU-R Working Party 4A and CPM have developed a draft example WRC Resolution as a means to address the agenda item (see CPM Report). A similar approach was used at WRC-15 in the FSS 29.5-30 GHz and 19.7-20.2 GHz frequency bands included in Resolution **156 (WRC-15)**.

Australia supports the approach of a new WRC Resolution to address the agenda item noting the protection requirements stated above and included in Resolution **158 (WRC-15)**. Also noting that the draft example WRC Resolution was preliminarily agreed but not finalised (due to different options/views, studies yet to be completed, and discussions yet to be concluded), Australia is actively engaged in further work on this Resolution.

Australia supports Method B of the CPM Report subject to the conditions mentioned above.

**3.1.5 China (People’s Republic of)** - **Document APG19-5/INP-67**

Considering the results of ITU-R studies show that the technical, operational and regulatory framework in the new RESOLUTION **[A15]** (**WRC-19**) could ensure ESIM not cause unacceptable interference to other services and systems operating in the same bands in accordance with the Radio Regulations, China supports Method B of the CPM text and proposes the APT Common Proposal on WRC-19 Agenda Item 1.5 as follows:

**Protection of terrestrial services in 17.7-19.7GHz and 27.5-29.5 GHz frequency bands:**

In the 17.7-19.7GHz band. ITU-R studies concluded that there would be potential interference from transmitting stations of terrestrial services to ESIM receivers in the band 17.7-19.7 GHz. The ESIM therefore should operate under the condition of not claiming protection from terrestrial services operating in accordance with RR.

In the 27.5-29.5GHz band. ITU-R studies concluded that in the band 27.5-29.5 GHz, terrestrial fixed and mobile service stations can be protected as follows:

1. Aeronautical ESIM (A-ESIM) should comply with PFD limits at the surface of the Earth, when in line-of-sight of a territory of an administration. Based on the ITU-R studies, China considers that the Option 1 PFD limits provide adequate protection to terrestrial services;
2. Maritime ESIM (M-ESIM) should comply with a mandatory minimum distance from the low-water mark of a coastal state and an associated maximum ESIM e.i.r.p spectral density limit towards the horizon. Based on the ITU-R studies, China considers that the minimum distance of 70 km provides adequate protection of terrestrial services together with an e.i.r.p limit of 12.98 dB(W/1 MHz);
3. No specific regulatory action or amendments to the Radio Regulations at WRC-19 are needed when land ESIM (L-ESIM) operates within national boundaries, but if the L-ESIM deploys within the border areas, the prior bilateral/multilateral agreement of the concerned administrations should be abided by.

The limits defined for a) and b) above can only be exceeded with prior agreement from the concerned administrations and are considered to be sufficient for the protection of terrestrial services. Therefore, prior to authorising aeronautical and maritime ESIM, an administration is not required to perform coordination with regards to terrestrial service stations of other administrations provided that the limits in a) and b) are met.

**Protection of space services in 17.7-19.7GHz and 27.5-29.5 GHz frequency bands:**

In the 17.7-19.7GHz band. The receiving ESIM shall not claim protection from other space systems operating in accordance with the Radio Regulations in the band 17.7-19.7 GHz, or impose constraints on future development of these space systems.

In the 27.5-29.5GHz band. Studies concluded that if ESIM transmissions remain within the envelope of the GSO FSS network with which ESIM communicates, the interference environment for other space services would remain unchanged and would therefore be acceptable.

Besides above, administrations authorizing ESIM in the frequency bands 17.7-19.7 GHz and 27.5-29.5 GHz shall require such earth stations to be subject to permanent monitoring and control by a Network Control and Monitoring Center (NCMC) or equivalent facility and these earth stations be capable to receive and act upon at least “enable transmission” and “disable transmission” commands from the NCMC.

**3.1.6 Japan, Republic of Korea and Singapore**- **Document APG19-5/INP-82**

Since the frequency bands 17.7-19.7 GHz and 27.5-29.5 GHz or some parts of these bands are used or planned to be used by FSS, MS and FS in Japan, Republic of Korea and Singapore are of the view that the used or planned FSS, MS and FS shall be protected appropriately from the interference by transmitting any type of ESIM (land, maritime and aeronautical) in the frequency band, and additional constraints shall not be imposed on these services even if the Method B is applied.

However, the present technical and operational conditions of ESIM to protect existing services in the Draft New Resolution [AI1.5] (WRC-19) will not ensure for ESIM to protect future development of the existing services sufficiently with regard to unexpected various interference scenarios. Therefore, the study under the WRC-19 Agenda Item 1.5 should consider the protection of existing and future development of incumbent services from the impact of ESIM.

In addition, it is noted that the obligation of ESIM to terrestrial services is not to cause unacceptable interference and not to claim protection with respect to terrestrial services. As long as unacceptable interference is occurred from any type of ESIM, the obligation of ESIM mentioned above cannot be replaced by anything else. Any type of ESIM should be operated only under this principles.

The following points are considered for the development of Japan, Republic of Korea and Singapore View and Proposal on Agenda Item 1.5.

* As concluded in the CPM Report, however, it is expected that there would be potential unacceptable interference from ESIM transmitters to receiving terrestrial stations.
* It is noted that the transmitting aeronautical and maritime ESIM in the frequency band 27.5-29.5 GHz shall not cause unacceptable interference to any stations in the terrestrial services in this band and shall not affect the future development of these services.

**3.1.7 Brunei Darussalam and Thailand** - **Document APG19-5/INP-97**

Brunei Darussalam and Thailand support Method B on modification of the Radio Regulations to add a new footnote in RR Article 5 that refers to a new WRC Resolution [A15] (WRC-19) with technical, operational and regulatory conditions for the operation of ESIM while ensuring protection of allocated services and consequential suppression of Resolution 158 (WRC-15).

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

Malaysia is of the view that deployment of ESIM in the frequency bands of 17.7-19.7 GHz (space-to-Earth) and 27.5-29.5 GHz (Earth-to-space) will enable expansion of FSS type of applications in providing broadband services.

In view of the above, Malaysia supports Method B which proposes addition of a new footnote in Radio Regulations Article 5 that refers to a new WRC Resolution [A15] (WRC-19) with technical, operational and regulatory conditions for the operation of ESIM while ensuring protection of allocated services and consequential suppression of Resolution 158 (WRC-15). Malaysia is also considering the following:

Maritime ESIM: May be considered with minimum distance from the low-water mark as officially recognised by the coastal State.

Aircraft ESIM: May be considered with maximum pfd limit and minimum altitude distance from ground.

In addition, Malaysia is of the view that, operation of ESIM, which complies with the mandated operational limits as stated in the new ITU-R Resolution should not release the relevant administrations and operators from their obligation to ensure protection of the existing services operating in 17.7-19.7 GHz and 27.5-29.5 GHz frequency bands.

**3.1.9 Republic of Korea** - **Document APG19-5/INP-129**

The Republic of Korea has views as follows:

- The proposed PFD mask in Report ITU-R S.[Agenda Item 1.5] may not be met below a certain altitude.

- Taking into account PFD limits for arrival angles and the velocity of A-ESIM, it may be almost impossible to examine whether PFD values for all visible area from A-ESIM are met or not on real-time basis.

Therefore, the Republic of Korea proposes altitude limitation for A-ESIM needs to be applied for protection of mobile service with an appropriate PFD mask. The proposal is contained in the joint proposal of Japan and Republic of Korea for Agenda item 1.5.

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

Based on input documents from APT Members, modifications to Draft New Resolution [A15] were discussed. APT members developed the PACP as shown in section 5.

**4. APT View(s)**

APT Members support the PACP as shown in section 5 based on the input contributions and discussions during the meetings.

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

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