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| APTlogogreen3 | ASIA-PACIFIC TELECOMMUNITY | **Document No.:**  |
| **The 3rd Meeting of the APT Conference Preparatory Group for WRC-19 (APG19-3)** | **APG19-3/OUT-02** |
| 12 - 16 March 2018, Perth, Australia | **15 March 2018** |

Working Party 3

**PRELIMINARY VIEWs 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 to aircraft, typically used to provide in-flight Internet connectivity for passengers. ESIM installed on ships are intended to be used to support broadband communications for passengers and crew, and to support maritime operational requirements. ESIM may also be installed on land vehicles such as trains and buses to provide Internet connectivity for passengers.

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**). In response to increasing needs of communications on the move, including the availability of global broadband satellite services, Resolution **158** (**WRC-15**) invites the ITU‑R to conduct studies related to the possible extension of the frequency range for ESIM to include the bands 17.7-19.7 GHz and 27.5-29.5 GHz.

After extensive discussion, WP 4A developed the working document on draft CPM text for this agenda item as well as an example Resolution that contains the regulatory and technical conditions based on ITU-R studies to enable ESIM to use 17.7-19.7 GHz and 27.5-29.5 GHz bands (Annex 29 to Doc. 4A/675) in its February/March 2018 meeting. WP4A also developed several working documents on the ESIM operation containing ESIM requirements, characteristics, spectrum use of ESIM, compatibility/sharing with other services and regulatory issues and so forth (Annex 10/11/12/13/14/15 to Doc. 4A/675). See details for section 3.2.

APG has noted the work carried out by AWG (APT Wireless Group) (APT/AWG/REP-70), on “The Usage and Future Plans of the Bands 17.7-20.2 GHz and 27.5-30 GHz in the Asia-Pacific Region”.

**2. Documents**

* Input Documents APG19-3/ INP-16Rev.1(IND), INP-23Rev.1(KOR), INP-36(NZL), INP-43(AUS), INP-51(J), INP-67(SNG), INP-76(MLA), INP-84Rev.1(VTN), INP-88(CHN)
* Information Documents APG19-3/INF-05Rev.1(Multi-affiliates), INF-06(CEPT), INF-08Rev.1(CITEL)

**3. Summary of Discussions**

**3.1 Summary of APT Members’ views**

**3.1.1 India** - **Document APG19-3/INP-16Rev.1**

India supports ITU-R studies to develop the regulatory framework for ESIM throughout all of the 17.7-19.7GHz and 27.5-29.5GHz bands to provide the required flexibility, with careful considerations to any possible interference to other existing services, as mandated in Resolution **158 (WRC-15)**.

**3.1.2 Korea (Republic of)** - **Document APG19-3/INP-23Rev.1**

The Republic of Korea proposes the modifications to the APT Preliminary View adopted at the APG19-2 as stated below:

“Taking into account Resolution **158 (WRC-15)**, APT Members support ITU-R studies for regulatory issues and conditions on sharing and compatibility between ESIM and existing services allocated in the frequency bands 17.7-19.7 GHz and 27.5-29.5 GHz to ensure protection of the existing services and their future development.

APT Members are of view that regulatory measures should be made for any type of ESIM to be operated on a non-interference and non-protection basis with respect to existing services and their future development allocated in these bands.”

**3.1.3 New Zealand**- **Document APG19-3/INP-36**

New Zealand supports the studies undertaken by ITU-R WP 4A in accordance with Resolution **158 (WRC-15)**. These studies should determine the regulatory measures to ensure that the introduction of different types of 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 sharing in the same frequency bands 17.7-19.7 GHz and 27.5-29.5 GHz.

**3.1.4 Australia** - **Document APG19-3/INP-43**

Australia supports establishment 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.

In support of this objective ITU-R Working Party 4A, the *responsible* ITU-R group for studies under WRC-19 agenda item 1.5, is considering a potential new WRC Resolution as a means to address the agenda item. A similar approach was used at WRC-15 in establishing technical and operational requirements for ESIM in the FSS 29.5-30 GHz and 19.7-20.2 GHz frequency bands included in the resolves of Resolution **156 (WRC-15)**. However, while not all provisions of Resolution **156 (WRC-15)** are relevant to frequency bands below 29.5/19.7 GHz, some alternative provisions may be necessary in a new Resolution. Australia supports this way forward in response to WRC-19 agenda item 1.5 noting the protection requirements stated above and included in Resolution **158 (WRC-15)**.

**3.1.5 Japan** - **Document APG19-3/INP-51**

Japan supports to conduct adequate studies in ITU-R to ensure protection of the existing services and not impose constraints for future use, on FS, MS and other FSS systems.

**3.1.6 Singapore** - **Document APG19-3/INP-67**

Singapore supports ITU-R studies to consider the potential for ESIM operations in the bands 17.7-19.7GHz and 27.5-29.5GHz with careful considerations to any possible interference to other existing primary services as mandated in Resolution **158 (WRC-15)** for these bands.

Considering the operational characteristics of ESIM platforms would involve moving from one location to another or from one country to another, a harmonised framework to support the coexistence of ESIMs operations with other services would be critical for ESIM operators. Such a framework would enable ESIM operators to maintain continuity of service, meet user requirements and provide the flexibility of operating within different parts of the bands 17.7-19.7 GHz and 27.5-29.5 GHz.

In view of the above, Singapore supports ITU-R studies to develop the regulatory framework for ESIM operations in the bands 17.7-19.7GHz and 27.5-29.5GHz to be as simple and practicable as possible while avoiding interference to other services. Guidelines within this framework should take into consideration both the current use and future availability of other services that are operating in the same frequency band Sharing possibilities could include adopting power-flux density limits to protect terrestrial services from Aero-ESIM, and a defined minimum distance from the coast to protect terrestrial services from Maritime-ESIM.

**3.1.7 Malaysia** - **Document APG19-3/INP-76**

In Malaysia, the frequency band 17.7-19.7 GHz is extensively used by point to point FS and FSS and frequency band 27.5-29.5 GHz is being used by Local Multipoint Communication System (LMCS), FSS and also devices using Ultra Wideband (UWB) technology in the unlicensed band.

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) for aircraft and maritime platforms may be considered, provided that protection and no additional constraint to existing services are assured.

Malaysia is also of the view that the deployment of land ESIM may be considered subject to studies conducted by ITU-R Working Party 4A show that sharing with existing services is feasible.

**3.1.8 Viet Nam (Socialist Republic of)** - **Document APG19-3/INP-84Rev.1**

The adopted regulatory framework for ESIMs will facilitate the deployment of satellite and earth station technology making ESIMs the best solution for users on the move. Therefore, Viet Nam is of the view that:

* Support studies that are ongoing for the use of the bands 17.7-19.7 GHz (space-to-Earth) and 27.5‑29.5 GHz (Earth-to-space) by ESIM.
* The different scenarios should be taken into account for the studies of the regulatory framework for the terminals used in ESIM to set-forth separated conditions for Maritime ESIM, Aircraft ESIM and Land ESIM.
* ESIM shall not claim protection from the Fixed Service, for the 17.7-19.7 GHz FSS band (space-to-Earth).

**3.1.9 China (People’s Republic of)** - **Document APG19-3/INP-88**

Pursuant to Resolution 158 (WRC-15), China supports sharing and compatibility studies for EISM applications. China is of the view that ESIM can operate in the 17.7-19.7 GHz and 27.5-29.5GHz frequency bands under sharing and compatible conditions, where ESIM doesn’t cause harmful interference to, nor claim protection from, incumbent services which operate in accordance with the Radio Regulations.

**3.1.10 Thailand** - **Document APG19-2/INP-66**

The global demand for broadband communications continues to be on the rise. Such demand includes requirements of connectivity for users on vessels, aircraft, train, and vehicles that operate at both fixed locations and while in motion, often in remote area.

Thailand is of the view that the regulatory issues and sharing condition/technical compatibility between ESIM and other incumbent applications such as the typical earth stations and applications in fixed service in the frequency bands 17.7-19.7 GHz and 27.5-29.5 GHz should be considered to ensure the protection of existing systems. Therefore, Thailand supports the development of an ITU-R regulatory framework dealing with operation of land, maritime and aircraft applications of ESIM, also taking into account that the issue of licensing ESIM operating beyond the territory of notifying administration is not covered by the RR.

**3.1.11 Iran (Islamic Republic of)** - **Document APG19-2/INP-71**

This Administration is of the view that the issue referred to in AI 1.5 is very complex and quite challenging, in particular regulatory and administrative aspects of the issue. However principles agreed at WRC-15 as contained in Resolution 156 (WRC-15) were considered quite relevant for issue to establish regulatory framework to address this agenda item. In addition, issue relating to circulation of ESIM, cumulative interference from ESIM to other services, determination of responsibilities between various players (Notifying administration of ESIM, Satellite operator of space station to which ESIM pertains and administration licensing ESIM on whose territory ESIM located), and other issues as contained in document APG19-2/INP-71 need to be fully studied and agreed upon. Based on the ongoing activities in the ITU-R and studies being carried out, the above preliminary views may be updated, modified as well as amended.

* 1. **Summary of issues raised during the meeting**
* It was noted that materials contained in this document are mostly based on the information available in ITU-R before the February/March 2018 meeting of WP4A and it is worth to mention that WP4A extensively discussed the agenda item 1.5 and drastically revised the information at the February/March 2018 meeting. It was further noted that these modified/revised texts/materials had not been available to APT Membership during their preparatory works for APG19-3 and the outcome of the above mentioned WP4A meeting will be further reviewed by that Working Party in the next and last meeting in July 2018 before the deadline established for submission of results of studies to CPM Management Group.
* The meeting recognized the significant progress of ITU-R studies at WP4A on this agenda item as mentioned above and agreed to support on-going studies.
* Some of outcomes from the recent WP4A’s studies are reflected in section 4.
* Though technical studies are not completed yet at WP4A, some APT Members expressed their views on possible sharing conditions and regulatory measures in the frequency bands 17.7-19.7 GHz and 27.5-29.5 GHz.
* A view was expressed that the band 27.5-29.5 GHz is available for 5G since this band is allocated to the mobile service on primary basis.

**4. APT Preliminary View(s)[[1]](#footnote-1)**

Taking into account Resolution 158 (WRC-15), APT Members support on-going ITU-R studies for regulatory issues and conditions on sharing and compatibility between ESIM and existing services allocated in the frequency bands 17.7-19.7 GHz and 27.5-29.5 GHz to ensure protection of, and not impose undue constraints on the existing services allocated in these bands and their future development.

**5. Other View(s) from APT Members**

Some APT Members are of the view that there may be no need for additional studies between receiving ESIM terminals and other services in the frequency band 17.7-19.7 GHz, because in which band, ESIM terminals are receiving and GSO FSS satellites that support ESIM terminals are no different from GSO FSS satellites that operate stationary FSS earth stations. ITU-R studies regarding this issue are not yet completed.

In the frequency band 27.5-29.5 GHz, some APT Members are of the view that sharing possibilities to protect terrestrial services could consider adopting power-flux density limits from Aero-ESIM and a defined minimum distance from the coast to protect terrestrial services from Maritime-ESIM. ITU-R studies regarding this issue are not yet completed.

Some other APT Members are of view that regulatory measures should be made for any type of ESIM to be operated on a non-interference and non-protection basis with respect to existing services allocated in these bands and their future development. ITU-R studies regarding this issue are not yet completed.

**6. Issues for Consideration at Next APG Meeting**

APT Members are encouraged to consider technical and regulatory matters and submit contributions to WP4A and next APG meeting.

**7. Views from Other Organisations**

**7.1 Regional Groups**

**7.1.1 ASMG** - **Document APG19-2/INF-01**

The use of ESIM stations in the frequency bands 27.5-29.5 and 17.7-19.7GHz is divided into three main types: stations on ships, stations on board aircraft and earth stations. Arab states is invited to study impact of these uses on the radio services allocated in the frequency bands 27.5-29.5 and 17.7-19.7GHz with respect to different types of ESIM stations. Preliminary position in support of no change to the RR for the frequency bands 27.5-29.5 and 17.7-19.7GHz with respect to ESIM usage.

* + 1. **ATU** - **Document APG19-2/INF-07**

APM19-1 considered that protection of existing systems as per Resolution 156 is paramount.

* + 1. **CEPT** - **Document APG19-3/INF-06**

Preliminary CEPT position:

CEPT supports a regulatory framework for the operation of earth stations in motion (ESIM) in the bands 17.7-19.7 GHz and 27.5-29.5 GHz, while ensuring protection of, and not imposing undue constraints on, services allocated in those frequency bands.

Due to the foreseen growing demand for ESIM and because ESIM terminals are in motion’ and world-wide use, the regulatory framework for these terminals needs to be as simple and practicable as possible. The following conditions are considered in the 27.5-29.5 GHz bands as a way forward:

* Maritime ESIM – together with other technical conditions, minimum distance limits at the low water mark officially recognized by coastal states might be adopted as has been done for Resolution 902 (WRC-03). ESIM should comply with these minimum distances unless prior agreement of the concerned administrations has been given.
* Aircraft ESIM – together with other technical conditions, the pfd limits on the earth’s surface as specified in ECC Decision (13)01, should form the basis for considerations within the relevant ITU-R Working Parties. This together with other consideration would ensure protection of terrestrial systems. ESIM should comply with these pfd limits unless prior agreement of the concerned administrations has been given.
* Land ESIM – operating within national boundaries no specific regulatory action or amendments to the Radio Regulations at WRC-19 are needed, but further consideration may be needed on methods for:
1. identifying with which countries an administration intending on authorising / deploying Land ESIM should first effect coordination and seek agreement with;
2. which methodology(-ies) may be used to effect such coordination.

Regarding the 17.7-19.7 GHz band, CEPT is of the view that ESIM shall not claim protection from the fixed and mobile services in the band. Regarding the 27.5-29.5 GHz band, the CEPT supports studying appropriate sharing techniques, including e.i.r.p. or pfd values for ESIM in order to protect the fixed and mobile services allocated in the bands.

CEPT has developed a Roadmap on 5G (<http://www.cept.org/ecc/topics/spectrum-for-wireless-broadband-> 5g#roadmap). In this respect it is noted that “Europe has harmonised the 27.5-29.5 GHz band for broadband satellite and is supportive of the worldwide use of this band for ESIM. This band is therefore not available for 5G.

* + 1. **CITEL** - **Document APG19-3/INF-08Rev.1**

Preliminary views from a few countries support studies but there is a need to consider the various types of ESIMs to develop appropriate provisions to protect existing and planned allocated services; one country is also of the view that studies should consider both GSO and NGSO systems, including non-GSO MSS feeder links

* + 1. **RCC** - **Document APG19-2/INF-05**

The RCC Administrations consider that technical conditions and regulatory provisions shall be developed with regard to operation of ESIMs communicating with geostationary space stations in the fixed-satellite service and using frequency bands 17.7-19.7 GHz (space-to-Earth) and 27.5-29.5 GHz (Earth-to-space) to provide protection, based on existing criteria, of services having allocations in these (and adjacent) frequency bands. Limitation of ESIM maximum off-axis e.i.r.p. spectral density, and other methods or their combinations, should be considered as the methods for sharing between ESIMs and GSO FSS stations and stations of other services having allocations in these frequency bands. ESIMs in the frequency bands 17.7-19.7 GHz shall not claim protection from fixed and mobile services. The RCC Administrations consider that when developing technical conditions and regulatory provisions for operation of ESIMs in the these frequency bands, special measures shall be envisaged to exclude unauthorized use of ESIMs in the territory of States that haven’t granted relevant authorizations (licenses). Regulations applicable to ESIM, which would be defined under the issue 9.1.7 of WRC-19 agenda item 9.1, shall be taken into account when developing regulations within the frameworks of WRC-19 agenda item 1.5.

**7.2 International Organisations**

**7.2.1 IARU**

No views on this agenda item have been received from IARU.

**7.2.2 ICAO**

No views on this agenda item have been received from ICAO.

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1. [Document No. APG19-3/OUT-01](https://www.apt.int/sites/default/files/2018/03/APG19-3-OUT-01_Meeting_Report_Adhoc_Plenary.docx) [↑](#footnote-ref-1)