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ITU-APT Foundation of India (IAFI)[1]

Study on Technical and Operational Measures for Coexistence between Terrestrial and Satellite IMT Systems Deployed in 1 980-2 010 MHz/2 170-2 200 MHz in the Asia-Pacific Region

Background

At its 27th meeting, the AWG considered all input contributions related to this subject and combined the inputs into the working document. Further, drafting activity was undertaken to review and revise the working document towards a consensus. However, the working document (AWG-27/TMP-54R1) still contains square brackets representing yet to be achieved consensus; on the contents of section 4 and an association with section 5, and inclusion of a reference to the CPM report to WRC-19. The intention was to consider the document in order to achieve consensus on the remaining issues so it may be considered for approval by the AWG-27 plenary. However, after further discussion in WG-SPEC, it was seen that a consensus on the text was not yet possible, and it was decided that this work would continue at AWG-28. Further contributions were invited towards this work.

Discussions

The proposal of IAFI to the AWG-28 relates to the inclusion of a reference to the CPM report to WRC-19. It may be noted that WRC decisions are international treaties accepted by all member states and the CPM report is only one of the inputs to a WRC. CPM report is a collection of views and options for satisfying various agenda items to facilitate the discussions at the WRC. Hence any reference to CPM, post the relevant WRC would not be a correct way and such references therefore should be removed.

Proposal

This contribution proposes deletion of the Editor's note on the above subject, as shown in the attachment and highlighted in green

[1] ITU-APT Foundation of India (IAFI) is a new Affiliate member of APT. Details of IAFI can be seen at itu-apt.org

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Attachment

WORKING DOCUMENT TOWARDS A DRAFT NEW AWG REPORT OF STUDY ON TECHNICAL AND OPERATIONAL MEASURES FOR COEXISTENCE BETWEEN TERRESTRIAL AND SATELLITE IMT SYSTEMS DEPLOYED IN THE FREQUENCY BANDS OF 1 980-2 010 MHZ AND 2 170-2 200 MHZ IN THE ASIA-PACIFIC REGION

1 Introduction

Noting that there are Fixed Service (FS), Mobile Service (MS), and Mobile-Satellite Service (MSS) for ~~Primary~~ primary allocations in the bands 1980-2010 MHz and 2170-2200 MHz in Radio Regulations, an individual administration can decide whether or not these bands to be used for FS, MS or MSS. The ITU-R has developed the frequency arrangements for these two bands to facilitate the implementation of terrestrial IMT systems, as shown in the arrangements B6 and B7 and parts of arrangements B3 and B5 in the Recommendation ITU-R M.1036. ~~Considering co~~Co-coverage and co-frequency deployment of independent satellite and terrestrial components of IMT in the bands 1 980-2 010 MHz and 2 170-2 200 MHz is not feasible unless techniques, such as the use of an appropriate guard-band, or other mitigation techniques are applied to ensure coexistence and compatibility between the terrestrial and satellite components of IMT. When these components are deployed in different countries in the same frequency bands, technical or operational measures need to be implemented if harmful interference is reported.

The ITU ~~has~~ set up the issue 9.1.1 under WRC-19 agenda item9.1, and invited WP 4C and 5D to jointly study possible technical and operational measures to ensure coexistence and compatibility between the terrestrial component of IMT and the satellite component of IMT in the bands 1980-2010MHz and 2170-2200MHz in different countries. Based on the conclusion results of these studies, WRC-19,~~meeting~~ which was held from 28 October to 22 November 2019 in Sharm el-Sheikh, ~~has already~~ concluded ~~and given~~gave the guidance on the implementation of technical and operational measures to facilitate coexistence between terrestrial and satellite components of IMT in the frequency bands 1 980-2 010 MHz and 2 170-2 200 MHz in Resolution 212 (REV. WRC-19).

2 Scope

This report analyzes the ~~status quo~~current situation and plans of IMT deployment in the bands of 1980-2010 MHz and 2170-2200 MHz in APT member countries. It also reviews and analyzes the related study results of ITU-R regarding the coexistence and compatibility for the deployment of satellite and terrestrial components of IMT in these bands.

Based on the ITU-R studies and Resolution 212 (~~REV~~Rev.WRC-19), this Report ~~is aiming~~gaims to facilitate the development and co-existence of both satellite and terrestrial components of IMT in the bands of 1980-2010 MHz and 2170-2200 MHz in the Asia-Pacific region. ~~Meanwhile, i~~It also provides information which may be considered by concerned Administrations.

3 Current status and future plans for the usage of the bands in APT countries

Since the 20th AWG meeting, APT Members ~~are~~ were invited to make contributions to update **APT Report-46** "*APT Frequency Usage of the Bands 1980-2010 MHZ and 2 170 - 2 200 MHz in Asia Pacific Region*", and the 23rd AWG meeting has finalized the Report, as shown in **APT Report-46 Rev.2**.

According to this ~~report~~Report, 12 APT members took part in the survey, Australia, Bangladesh, Cambodia, China, Japan, Korea, Micronesia, Singapore, Thailand, Tonga, Vanuatu and Viet Nam. As shown by the statistics of the survey in **Table 1**, there is no unified allocation for these two frequency bands 1980-2010 MHz and 2170-2200 MHz in APT countries for the current status or the future plans. Specifically, considering the important role and the scarcity of the spectrum resource, these bands are currently being used or planned to be used for MSS in some APT countries, like China, Tonga, Singapore, Micronesia etc. On the other hand, it is well noted that there are also some countries planning to allocate these two bands to terrestrial IMT exclusively, while some countries are still under consideration about the practical allocations in these two bands.

TABLE 1

Statistics of the survey in the Report APT /Report 46

No.	Country	Current Allocations	Current Applications	Future Plans
1	Australia	Fixed service Mobile service	Point to Point, Television	Mobile broadband[2]
2	Bangladesh	1980-2010, Mobile service 2170-2200, No service	3G, CDMA, Guard band	CDMA IMT Satellite
3	Cambodia	Fixed service	Multichannel Multipoint Distribution Service	None
4	China	Mobile-Satellite Service	GMR Personal Communication	Mobile-Satellite Service
5	Japan	Mobile Service Mobile-Satellite Service	Disaster Relief	Under study
6	Korea	Mobile Service Mobile-Satellite Service	None	Mobile Service Mobile-Satellite Service[3]
7	Micronesia	Satellite Service	VSAT	None
8	Singapore	Mobile-Satellite Service	Satellite Mobiles	None
9	Thailand	Fixed service Mobile Service Mobile-Satellite Service	None	None
10	Tonga	Fixed service Mobile Service Mobile-Satellite Service	Satellite Mobiles	Under study
11	Vanuatu	1980-2110, No service 2170-2200, Fixed service	Backhaul	None
12	Viet Nam	Fixed service Mobile Service Mobile-Satellite Service	Identified for IMT	Terrestrial IMT[4]

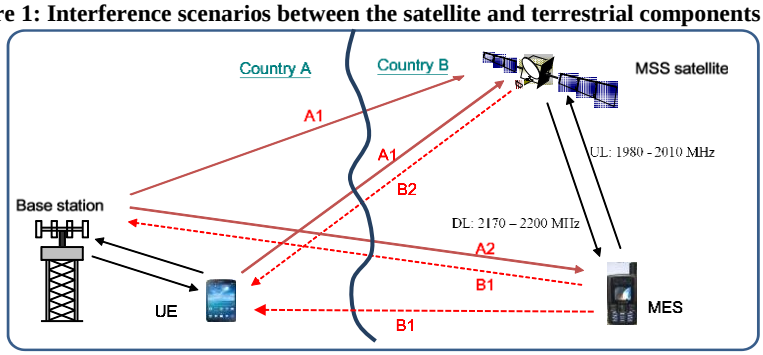
[2] Australia is now planning Mobile-Satellite Service usage in this band
[3]Republic of Korea is planning for Terrestrial IMT
[4]Viet Nam plans to implement IMT system aligned with frequency arrangement B6 of ITU-R Recommendation ITU-R M.1036-6 or 3GPP band plan number 65

Both the terrestrial and satellite components of IMT have already been deployed or are being considered for deployment in these two frequency bandsin different countries.

4 Related compatibility studies in ITU-R

[The issue of coexistence and compatibility between the terrestrial component of IMT (comprised of base station(s) (BS(s)) and user equipment (UE)) and the satellite component of IMT (comprised of MSS space stations and mobile earth station(s) (MES(s)) in different countries was considered in four interference scenarios, A1, A2, B1, and B2, respectively.

Figure 1: Interference scenarios between the satellite and terrestrial components of IMT



Scenarios A1 and A2 consider interference to the satellite system from the terrestrial system. In particular, Scenario A1 investigates the uplink interference issue from UEs and BSs to the satellite in 1 980-2 010 MHz, and Scenario A2 investigates the downlink interference issue from BSs to satellite MES in 2 170-2 200 MHz.

Scenarios B1 and B2 consider interference to the terrestrial system from the satellite system. In particular, Scenario B1 investigates the uplink interference issue from MES to BS and UE in 1 980-2 010 MHz, and Scenario B2 investigates the downlink interference issue from the satellite to UE in 2 170-2 200 MHz.

Table 2: Interference scenarios

Scenario	Interference From	Interference To	Frequency Band
A1	IMT BS (downlink) IMT UE (uplink)	IMT space station	1 980-2 010 MHz
A2	IMT BS	IMT MES	2 170-2 200 MHz
B1	IMT MES	IMT BS IMT UE	1 980-2 010 MHz
B2	IMT space station	IMT UE	2 170-2 200 MHz

]

Theoutcome of discussion at WRC-19 on this issue are contained in Resolution 212 (Rev. WRC-19).

~~[Editors note: some members are of the view to retain a reference to CPM Report to WRC-19; Section 2/9.1.1/3; some members are of the view this reference is unnecessary because no~~

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~~agreement was reached by WP4C and WP5D, the views expressed in the CPM Report were not fully reviewed and are divergent and no summary of ITU-R study results exist~~

5 Technical and operational measures for coexistence

From Table 1 in section 3 above, it is clear that several countries in the Asia-Pacific region have deployed or are going to deploy satellite or terrestrial IMT systems in these bands.

It is desirable for the APT countries to study possible solutions related to the frequency arrangements in the bands1980-2010 MHz and 2170-2200MHz in order to address the specific requirements of the Asia-Pacific region, with the focus to reach the compatibility and coexistence between IMT terrestrial and satellite components in these bands.

The ITU-R has developed the frequency arrangements in the bands 1980-2010 MHz and 2170-2200 MHz to facilitate the implementation of terrestrial IMT systems, as shown in the arrangements B6 and B7 and parts of arrangements B3 and B5 in the Recommendation ITU-R M.1036~~-5~~.

TABLE 2

Frequency arrangements from Recommendation ITU-R M.1036and possible interference scenarios

Frequency arrangements	Mobile station transmitter (MHz)	Base station transmitter (MHz)	Interferer	Interfered	Corresponding Interference Scenario
B3	1 850-1 920	**1 930-2 000**	BS	IMT SAT	A1
			MES	UE	B1
B5 (harmonized with B3 andpartially harmonized with the downlink of B1 and the uplink of B2)	1 850-1 920	**1 930-2 000**	BS	IMT SAT	A1
			MES	UE	B1
	1 710-1 780	**2 110-2 180**	BS	MES	A2
			IMT SAT	UE	B2
B6	**1 980-2 010**	**2 170-2 200**	UE	IMT SAT	A1
			MES	BS	B1
			BS	MES	A2
			IMT SAT	UE	B2
B7	**2 000-2 020**	**2 180-2 200**	UE	IMT SAT	A1
			MES	BS	B1
			BS	MES	A2
			IMT SAT	UE	B2

Table 2 shows the frequency arrangements from Recommendation ITU-R M.1036 with the bands which fully or partially overlap with the MSS allocations emphasized in bold. The possible interference scenarios between the different stations of the satellite and terrestrial components of IMT. However, whether all these four arrangements apply to the Asia Pacific region depends largely on the results of compatibility studies and the actual deployment of IMT systems in the region. The interference results referring to four scenarios could provide constructive guidelines for administrations when deploying the satellite and terrestrial IMT systems to ensure the compatibility in different countries.

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For scenarios A2 and B1, based on the compatibility studies in the ITU-R, it is shown that the coexistence between the terrestrial and satellite components of IMT could be managed by the current cross-border coordination provisions in the RR Nos. 9.15, 9.16, 9.17, 9.18, employing such as distance separation, more realistic parameters of radio stations and actual local propagation conditions, including actual terrain and clutter effects.

~~As for~~ For scenario A1, there are two options of frequency arrangements for terrestrial IMT system in the band 1980-2010 MHz in line with Rec. M.1036~~-5~~. One is B3 and B5 arrangementsfor IMT BSs, the other is B6 and B7 arrangementsfor IMT UEs. [The summary of these results shows that the level of interference from IMT BS into the IMT space stations is much high, while the level of interference from IMT UE into the IMT space stations is low.]

For Scenario B2, in the frequency band 2 170-2 200 MHz, potential interference from the IMT space stations to IMT UEs, could be managed by bilateral/multilateral negotiation, in which actual technical/operational characteristics and mitigation measures for satellite and terrestrial components of IMT could be taken into account.

Based on the ITU-R studies, some technical and operational measures are found in the Annex to Resolution 212 (~~REV~~Rev, WRC-19) which provide guidance to concerned administrations in the deployment of terrestrial and satellite components of IMT for reducing the potential of harmful interference between two systems.

6 Possible solutions in Asia-Pacific region

Pursuant to Resolution 212 (Rev.WRC-19) administrations should take the technical and operational measures, such as those found in the annex to that Resolution administrations are invited to consider the possible solutions to facilitate coexistence between the terrestrial and satellite components of IMT in the frequency bands 1 980-2 010 MHz and 2 170-2 200 MHz in Asia-Pacific:

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