

ANALYSIS OF THE IMPACT OF WRC-23 OUTCOMES ON BROADCASTING SERVICE IN THE ASIA-PACIFIC AREA

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SUMMARY:

This paper delineates the outcomes of the recent World Radiocommunication Conference 2023 (WRC-23). It provides a clear understanding of the global regulatory landscape and its potential impact on the broadcasting service in the Asia-Pacific area.

INTRODUCTION

The recent World Radiocommunication Conference (WRC-23) successfully concluded in December 2023 and achieved impressive outcomes in new terrestrial and space services. These results will greatly improve the way we communicate on land, in the air and at sea for everyone served by the world's radio frequency spectrum, and will have long-term social, economic and environmental impacts on all nations for generations to come.

During the WRC-23 meeting, Member State delegates of the International Telecommunication Union (ITU) undertook a comprehensive review of Radio Regulations to ensure that the international framework for the management of the radio frequency spectrum and associated orbital resources are kept up to date. At the same time, the conference found a solution to a wide range of technological challenges, supporting spectrum sharing and on-going innovation to enable global harmonisation over the next four years and beyond. This article is dedicated to an analysis of the impact of WRC-23 conference outcomes on broadcasting operations in the Asia-Pacific region.

WRC-23 1.2 AGENDA ITEM

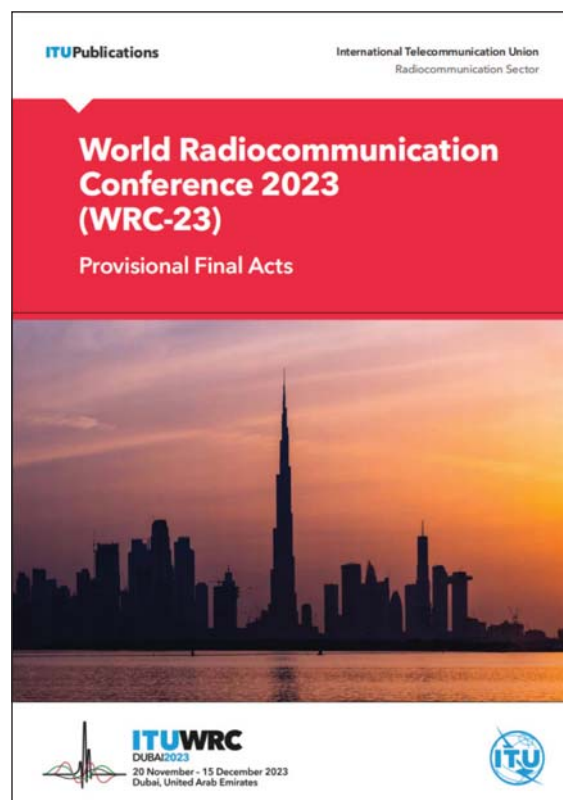
This item is to identify the frequency bands 3300-3400MHz (Region 1¹ & 2²), 3600-3800MHz (Region 2), 6425-7025MHz (Region 1), 7025-7125MHz (global) and 10.0-10.5GHz (Region) for International Mobile

Telecommunications (IMT), including possible additional allocations to the mobile service on a primary basis. The Radio Regulations do not clearly allocate the band 3700-4200MHz to broadcasting-satellite services on a primary basis in the Asia-Pacific area (Region 3³). In practice, many countries in Region 3 transmit radio and television programs through fixed satellite services (space-to-Earth). Therefore, the identification of IMT on the band 3600-3800MHz in Region 2 will impact the satellite transmission of radio and television programs in the Asia-Pacific area.

In accordance with the WRC-23, a new footnote No. 5.36A12 has been established which stipulates that "in the Bahamas, Belize, Brazil, Canada, Colombia, Costa Rica, United States, Guatemala, the French overseas departments and communities in Region 2, Greenland, the overseas countries and territories within the Kingdom of the Netherlands in Region 2, Paraguay, Peru, Trinidad and Tobago and Uruguay, the frequency band 3700-3800MHz is identified for use by any of these administrations wishing to implement International Mobile Telecommunications (IMT)." In addition, No.

5.434 has been updated to include the identification of IMT in Region 2 within the band 3600-3700MHz. Meanwhile, Nos. 5.434 and 5.36A12 footnotes clearly state that the IMT logo does not hinder other businesses that have been division and is not a priority. The implementation of IMT is required to ensure the protection of the fixed-satellite service (space-to-Earth).

Administrations wishing to implement IMT shall obtain the agreement of neighbouring countries to ensure the



protection of the fixed-satellite service (space-to-Earth). This condition ensures the use of satellite transmission of radio and television programs in the Asia-Pacific area and to avoid potential frequency interference. Since Regions 2 and 3 do not have direct terrestrial borders, the fixed-satellite service (space-to-Earth) can limit coverage to avoid interference. Therefore, WRC-23's decision on this item will have minimal impact on the transmission of radio and television programs in the Asia-Pacific area.

WRC-23 1.3 AGENDA ITEM

This item is to consider the primary allocation of the frequency band 3600-3800MHz to the mobile service in Region 1 and take appropriate regulatory action. This item is similar to the item 1.2. The Radio Regulations do not clearly allocate the band 3700-4200MHz to broadcasting-satellite services in the Asia-Pacific area (Region 3). In practice, many countries in Region 3 transmit radio and television programs through the fixed satellite service (space-to-Earth). Therefore, the primary allocation of the frequency band 3600-3800MHz to the mobile service in Region 1 will impact the satellite transmission of radio and television programs in the Asia-Pacific area.

The WRC-23 reached a consensus on this item and subsequently introduced four new footnotes, Nos. 5.A13A, 5.A13B, 5.A13C and 5.A13D. No. 5.A13A provides technical constraints and coordination procedures for the use of mobile services (except aeronautical mobile) in the band 3600-3800MHz. No. 5.A13B specifies that the band 3600-3800MHz is allocated to mobile service secondary in some countries. No. 5.A13C stipulates that in some countries the band 3600-3700MHz is identified for IMT. No. 5.A13D mandates that in some countries the band 3600-3800MHz is identified for IMT, with the stipulation that this identification does not preclude the use of this frequency band by any application of the services to which it is allocated and does not establish priority in the Radio Regulations. It is further clarified that the conditions of No. 5.A13A shall apply.

In No. 5.A13A, the technical restrictions are specified that for the protection of stations in the fixed and fixed-satellite services, it shall ensure that the pfd produced at 3 m above ground does not exceed $-154.5 \text{ dB (W/(m}^2 \bullet 4 \text{ kHz))}$ for more than 20% of the time at the

border of the territory of any other administration. In addition, stations in the mobile service operating in the frequency band 3600-3800MHz shall not claim more protection from space stations than that provided in Table 21-4 of the Radio Regulations. Although Region 1 has extensive land borders with Region 3 countries, IMT implementation must strictly comply with prescribed technical restrictions, thus ensuring the transmission of radio and television programmes in Region 3. However, it must be noted that as more countries allocate this frequency band to IMT, the transmission of radio and television programs through fixed-satellite service (space-to-Earth) will face increasing restrictions.

WRC-23 1.4 AGENDA ITEM

This item is to consider the use of high-altitude platform stations as IMT base stations (HIBS) in the mobile service in certain frequency bands below 2.7 GHz already identified for IMT, on a global or regional level. The candidate band 694-960 MHz is related to the band 470-702MHz used by digital terrestrial television in the Asia-Pacific area.

WRC-23 takes a decision on this item, adding two new footnotes Nos. 5.14A and 5.14B. In No. 5.14A, the band 698-960MHz, or portions thereof, in Region 2, and the band 694-960MHz, or portions thereof, in Region 1, are identified for use by HIBS. In No. 5.14B, the frequency band 698-960MHz, or portions thereof, in Australia, Maldives, Micronesia, Papua New Guinea, Tonga and Vanuatu, the frequency bands 703-733MHz, 758-788MHz, 890-915MHz and 935-960MHz, or portions thereof, in China, India, Indonesia, Japan, Korea (Rep. of), Malaysia, the Philippines and Thailand are identified for use by HIBS. Furthermore, Nos. 5.14A and 5.14B clearly state that this identification does not preclude the use of these frequency bands by any application of the services to which they are allocated and does not establish priority in the Radio Regulations. In addition, HIBS shall not claim protection from existing primary services.

Given that the power of digital terrestrial TV transmitters is far greater than that of HIBS transmitters, HIBS will not be deployed with digital terrestrial TV in the same frequency band, thus ensuring the use of the existing digital terrestrial TV in the Asia-Pacific area.

WRC-23 1.5 AGENDA ITEM

This item is a new primary allocation of

the band 470-694MHz to mobile service in Region 1, relating to the band 470-702MHz used by digital terrestrial TV in the Asia-Pacific area.

The outcome of the item is to add 3 new footnotes Nos. 5.15A, 5.15B and 5.15C, allocating the band 470-694MHz on a secondary basis to the mobile service in 44 European countries and the band 614-694MHz in eight African countries, while allocating the band 614-694MHz on a secondary basis to mobile service in 11 countries of the Middle East with IMT identification. Modify No. 5.294 to allocate the band 470-582MHz to the fixed service on a secondary basis in Palestinian. Revise No. 5.296 to allocate the band 470-694MHz on a secondary basis to the land mobile service, intended for applications ancillary to broadcasting and programme-making. Modify Resolution 235 to consider upgrading the mobile service on a primary basis in the band 614-694MHz at the WRC-31 meeting (referring to 44 European countries, see No.5.15A).

In 11 Middle Eastern countries, the band 614-694MHz frequency is allocated on a primary basis to the mobile service with IMT identification. However, extremely strict coordination conditions are given. Stations in the mobile service shall not create a field strength for more than 1% of the time at the highest of the clutter height or 10 m above ground level at the border of the territory of any other administration that exceeds the field strength value as calculated using §4.1.3.2 of Annex 2 to the GE06 Agreement with regard to allowance for multiple interference, Table AP1.10 and the methodology given in the GE06 Agreement. Stations in the mobile service of the countries listed in this footnote shall not cause harmful interference to or claim protection from the existing and future broadcasting stations of the neighbouring countries operating in accordance with the GE06 Plan. This identification does not preclude the use of these frequency bands by any application of the services to which they are allocated and does not establish priority in the Radio Regulations and shall in no way adversely affect the development of the existing and future broadcasting service in accordance with the GE06 Agreement. For countries party to the GE06 Agreement, the use of stations in the mobile service is also subject to the successful application of the procedures of that Agreement. This allocation does not establish priority in

the Radio Regulations and shall allow the implementation and development of the broadcasting service in accordance with the GE06 Agreement. These 11 Middle Eastern countries are not adjacent to countries in the Asia-Pacific area except Iran, and Iran is a party to the GE06 Agreement, so terrestrial digital TV in the Asia-Pacific area will not be affected.

At present, 30 countries around the world have allocated the band 600 MHz to IMT through footnotes. In addition, pursuant to Resolution 235, WRC-31 will consider the primary allocation of the band 614-694 MHz to the mobile service with IMT identification in Region 1. This trend suggests that IMT's continued expansion into the band 600 MHz could adversely affect terrestrial digital TV in the Asia-Pacific area. Therefore, we must closely monitor these developments and take appropriate action to address potential challenges.

WRC-23 1.19 AGENDA ITEM

This item is to consider the allocation of the band 17.3-17.7GHz to the fixed-satellite service (space-to-Earth) in Region 2. Since the band 17.3-17.7GHz is allocated to the fixed-satellite service (Earth-to-space) in Region 3, the band 17.3-18.1GHz is involved for the feeder link of satellite broadcasting service.

WRC-23 decided on this item, adding new footnotes Nos. 5.A119 and 5.C119 to allocate the band 17.3-17.7GHz to the fixed-satellite service (space-to-Earth) on a primary basis with the coordination procedures and technical restrictions in Region 2. In addition to the need to comply with the coordination criteria in Annex 4 of Article 7 of Appendix 30A, under assumed free-space propagation conditions, the power flux-density of an assignment in the fixed-satellite service (space to-Earth) of a geostationary-satellite network in the frequency band 17.3-17.7GHz in Region 2 shall not exceed the value of $-98 \text{ dB(W/(m}^2 \bullet 27 \text{ MHz))}$ at points in the geostationary-satellite orbit with geocentric orbital separation angles between 152.6° and 162.6° .

The above regulations put forward strict coordination procedures and technical limits for the fixed-satellite service (space-to-Earth) and ensure the use of feeder link for broadcasting service in the Asia-Pacific area.

WRC-27 AGENDA ITEMS

The following six WRC-27 agenda items relate to the broadcasting service in the Asia-Pacific area.

WRC-27 1.4 agenda item is to consider a possible new primary allocation to the fixed-satellite service (space-to-Earth) in the frequency band 17.3-17.7 GHz and a possible new primary allocation to the broadcasting-satellite service (space-to-Earth) in the frequency band 17.3-17.8 GHz in Region 3, while ensuring the protection of existing primary allocations in the same and adjacent frequency bands, and to consider equivalent power flux-density limits to be applied in Regions 1 and 3 to non-geostationary-satellite systems in the fixed-satellite service (space-to-Earth) in the frequency band 17.3 17.7 GHz, in accordance with Resolution COM6/24 (WRC 23). This item is related to a possible new primary allocation of satellite broadcasting service(space-to-Earth).

WRC-27 1.6 agenda item is to consider technical and regulatory measures for fixed-satellite service satellite networks/ systems in the frequency bands 37.5-42.5 GHz (space-to-Earth), 42.5-43.5 GHz (Earth-to-space), 47.2-50.2 GHz (Earth-to-space) and 50.4-51.4 GHz (Earth-to-space) for equitable access to these frequency bands, in accordance with Resolution 131 (WRC-23). According to the Radio Regulations, the band 40.5-42.5 GHz band is allocated to the broadcasting and broadcasting-satellite services, but there is no actual system used in this band, so there is no need to track this issue.

WRC-27 1.9 agenda item is to consider appropriate regulatory actions to update Appendix 26 to the Radio Regulations in support of aeronautical mobile (OR) high frequency modernisation, in accordance with Resolution 411 (WRC-23). The item is related to the broadcasting service in the band 3900-3950kHz in Region 3 and the band 4750-4850kHz in Region 1.

WRC-27 1.10 agenda item is to consider developing power flux-density and equivalent isotropically radiated power limits for inclusion in Article 21 of the Radio Regulations for the fixed-satellite, mobile-satellite and broadcasting-satellite services to protect the fixed and mobile services in the frequency bands 71-76 GHz and 81-86 GHz, in accordance with Resolution 775 (Rev.WRC-23). According to the Radio Regulations, the band 74-76GHz

is allocated to the broadcasting and broadcasting-satellite services, but there is no practical system in use in this band, so there is no need to focus on this issue.

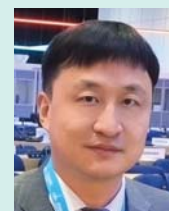
WRC-27 1.13 agenda item is to consider studies on possible new allocations to the mobile-satellite service for direct connectivity between space stations and International Mobile Telecommunications (IMT) user equipment to complement terrestrial IMT network coverage, in accordance with Resolution 253 (WRC-23). The item is related to the 694/698MHz to 2.7GHz band, given that some countries in the Asia-Pacific area have used the band 694-702MHz for digital terrestrial TV.

WRC-27 1.17 agenda item is to consider regulatory provisions for receive-only space weather sensors and their protection in the Radio Regulations, considering the results of ITU Radiocommunication Sector studies, in accordance with Resolution 682 (WRC-23). The item is related to the digital terrestrial TV in the Asia-Pacific area.

REFERENCES:

- ¹ According to ITU, Region 1 refers to Europe, Africa, the Middle East and the CIS area.
- ² According to ITU, Region 2 refers to the American area.
- ³ According to ITU, Region 3 refers to the Asia-Pacific area.

AUTHOR:



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