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## IAFI

### UPDATE TO SECTION 5 OF DRAFT CPM TEXT OF AI 1.1

In this contribution IAFI proposes revisions to Sections 5.1 to 5.5 of the WORKING DOCUMENT TOWARDS A PRELIMINARY DRAFT CPM TEXT FOR WRC-23 AGENDA ITEM 1.1 (Annex 4.7 to Document 5D/1361-E).

- The proposed changes to the text of Methods A, B, C and D in Section 5 are in keeping with RR 5.442 and *resolves 3* of Resolution 223 (Rev. WRC-19).

According to 5.442, in the frequency bands 4 825-4 835 MHz and 4 950-4 990 MHz, the allocation to the mobile service is restricted to the mobile, except aeronautical mobile, service.

In *resolves 3*, the procedure for seeking agreement under No. 9.21 by IMT stations in relation to aircraft stations, is applied to the frequency bands 4 800-4 825 MHz and 4 835-4 950 MHz.

Therefore, the protection criteria for AMS in RR 5.441B shall only apply to the frequency bands 4 800-4 825 MHz and 4 835-4 950 MHz, not the entire band of 4 800 – 4 990 MHz.

- Feeder loss of zero (0) dB is used in deriving the PFD values in Tables XX and YY  
In section 3.4.2 a footnote has been added to clarify that a feeder loss of zero dB is used in calculating the PFD values in Table XX and Table YY

- Method C (Option 3)

Directional antenna of airborne AMS system and shipborne MMS system should be pointed away from the territories of coastal states and so only the PFD limits of systems using omni-directional antenna should be considered. The lowest PFD limit in Table XX of section 3.4.2 is that of System 4 (airborne) using omni-directional antenna, at  $-116.57 \text{ dB(W/(m}^2 \cdot \text{MHz))}$ .

In Table YY of section 3.4.2 the lowest PFD limit of a shipborne system with omni-directional antenna is that of System 1, at  $-114.57 \text{ dB(W/(m}^2 \cdot \text{MHz))}$ .

In Option 3 it is proposed that the pfd limits of  $-117 \text{ dB(W/(m}^2 \cdot \text{MHz))}$  for AMS and  $-115 \text{ dB(W/(m}^2 \cdot \text{MHz))}$  for MMS, be used in the pfd criteria without the use of an aggregation factor. This pfd limit will be the value measured as produced by IMT base stations on the territories of coastal states.

The use of aggregation factor is based on the speculation that the implementation of IMT is the same in all coastal states. It takes away the option of coastal states to managed the use of the frequency bands as they see fit.

The issue of aggregation is much reduced if the distance from the coast is greater than the radio horizon of the of the receiving station.

- Method F  
Text based on 5.441A is proposed for Method F in Section 5.5

The proposed changes are made in Attachment 1 below and are highlighted in Gray



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**Annex 4.7 to  
Document 5D/1361-E  
30 June 2022  
English only**

**Annex 4.7 to Working Party 5D Chairman's Report**

**WORKING DOCUMENT TOWARDS A PRELIMINARY DRAFT CPM TEXT  
FOR WRC-23 AGENDA ITEM 1.1**

**CHAPTER 1**

**Fixed, Mobile and Broadcasting issues**

(Agenda items 1.1, 1.2, 1.3, 1.4, 1.5)

**Agenda item 1.1**

**(WP 5B and WP 5D\* / WP 1B, WP 3K, WP 3M, WP 5C, WP 7D)**

*1.1 to consider, based on the results of the ITU-R studies, possible measures to address, in the frequency band 4 800-4 990 MHz, protection of stations of the aeronautical and maritime mobile services located in international airspace and waters from other stations located within national territories, and to review the pfd criteria in No. 5.441B in accordance with Resolution 223 (Rev.WRC-19);*

*Resolution 223 (Rev.WRC-19) – Additional frequency bands identified for International Mobile Telecommunications*

...

**1/1.1/2 Background**

*[Text of the background, not more than half a page of text to provide general information in a concise manner, in order to describe the rationale of the agenda items (or issue(s)) See also § A2.2 of Annex 2 to [Resolution ITU-R 2-8](#)]*

\* Note: WP 5B and WP 5D to work jointly. WP 5B to provide characteristics and protection criteria for the aeronautical and maritime mobile services. WP 5D initiates studies with characteristics of IMT. Studies must take into account comments from both Working Parties (*invites the ITU-R 2*). WP 5D in consultation with WP 5B develops reports/recommendations, as appropriate, which are approved by SG 5 in accordance with Resolution ITU-R 1-8 (*invites the ITU-R 4*). WP 5B and WP 5D develop relevant parts, as appropriate, of the draft CPM text. WP 5D finalizes draft CPM text taking into consideration comments by WP 5B (*for invites WRC-23*).

## **Situation at WRC-15**

WRC-15 established RR No. **5.441B** which provided IMT identification for three Region 3 countries in the 4 800-4 990 MHz frequency band, already allocated to the MS on a primary basis, and introduced *inter alia* additional criterion consisting of a limit on the pfd produced by IMT station up to 19 km above sea level at 20 km from the coast in order to protect AMS. This criterion was subject to review at WRC-19.

Due to diverging views with regards to the relevance of pfd criterion to protect AMS, its value, conditions and frequency band for its application, noting that preparatory work was not finalized, WRC-15 invited ITU-R to study the technical and regulatory conditions for the use of IMT in this band in order to protect AMS and review pfd criterion in RR No. **5.441B** at WRC-19.

## **Situation at WRC-19**

As invited by WRC-15, in accordance with Resolution **223 (Rev.WRC-15)** ITU-R carried out but did not finalize studies mentioned above. The report on the above mentioned ITU-R studies was submitted to WRC-19 for its consideration and necessary action, as appropriate.

WRC-19 updated footnote RR No. **5.441B** and Resolution **223 (Rev.WRC-19)** and as a result additional countries were included in the IMT identification in footnote RR No. **5.441B** (now footnote includes 40 countries) and for 11 of these countries the pfd criterion in footnote RR No. **5.441B** was deactivated. However, due to diverging views on whether or not to apply a pfd criterion, WRC-23 was invited, in accordance with Resolution **223 (Rev.WRC-19)**, to consider possible measures to address protection of stations of the aeronautical and maritime mobile services located in international airspace and waters from other stations located within national territories, and to review the pfd criterion in RR No. **5.441B**.

WRC-19 therefore adopted WRC-23 agenda item (AI) 1.1 referred to above.

### **1/1.1/3 Summary and analysis of the results of ITU-R studies**

*[This section should contain a summary of the technical and operational studies performed within ITU-R, including a list of relevant ITU-R Recommendations. Depending on the agenda item, this section could be divided in two parts, one part dealing with the summary and the other part dealing with the analysis.]*

*The results of the ITU-R studies should also be analysed with respect to the possible methods of satisfying the agenda item and presented in a concise manner.]*

*[Editor's note: The sub-structure of this section will be reviewed further as the studies progress]*

#### **1/1.1/3.1 Applicable ITU-R Recommendations and Reports**

Recommendation ITU-R M.2116 Technical characteristics and protection criteria for the aeronautical mobile service systems operating within the 4 400-4 990 MHz frequency range

*[TBD]*

#### **1/1.1/3.2 Usage scenarios and deployments characteristics**

*[This section provides the relevant deployments characteristics]*

### **1/1.1/3.2.1 IMT systems**

IMT systems characteristics are described in the section 5.3 of the working document towards a preliminary draft new Report ITU-R M.[Conditions 1.1]

### **1/1.1/3.2.2 Maritime systems**

Maritime systems characteristics are described in the section 5.2 of the working document towards a preliminary draft new Report ITU-R M.[Conditions 1.1]

### **1/1.1/3.2.3 Aeronautical systems**

Aeronautical systems characteristics are described in the section 5.1 of the working document towards a preliminary draft new Report ITU-R M.[Conditions 1.1]

### **1/1.1/3.3 Summary of the results of studies**

*[This section provides a summary for the conducted sharing and compatibility studies in WP 5D.]*

In preparation for WRC-15 ITU-R carried out sharing and compatibility studies between aeronautical mobile/ground mobile applications and potential IMT systems in the 4 400-4 990 MHz frequency band that resulted in PDN Report ITU-R M.[AERO-IMT.SHARING.C-BAND] (see Annex 33 of the Chairman's Report of the final meeting of JTG-4-5-6-7 – Document [4-5-6-7/715](#)) and in Section 1/1.1/4.1.9.1 of the CPM Report to the 2015 World Radiocommunication Conference.

These technical studies considered co-channel and adjacent channel sharing scenarios.

WRC-15 adopted RR No. **5.441B** and identified the frequency band 4 800-4 990 MHz, or portions thereof, for use by administrations wishing to implement International Mobile Telecommunications (IMT) and established, among other things, the pfd limit for use of the IMT in that frequency band as an additional measure to provide protection of AMS outside the territorial water of coastal states. This pfd criterion was subject to review at WRC-19, see Resolution **223 (Rev.WRC-15)**. It also decided that this identification shall be effective after WRC-19.

The pfd criterion as in RR No. **5.441B** was not resulting from ITU-R studies in preparation of WRC-15 but from discussions in WRC-15 since for co-channel scenario the above-mentioned technical studies concluded that sharing between aeronautical mobile applications and IMT systems in 4 400-4 990 MHz is not practical.

The pfd value of  $-155 \text{ dB(W/(m}^2 \cdot 1 \text{ MHz))}$  was derived based on simplified assumptions during WRC-15. This pfd value was based on IMT indoor small cells deployment and one specific AMS system.

WRC-19 attempted to review that criterion without any definitive outcome. It therefore adopted the WRC-23 agenda item 1.1 by which it invited the ITU Radiocommunication Sector to study the technical and regulatory conditions for the protection of stations of the AMS and the maritime mobile service (MMS) located in “international airspace or waters” (i.e., outside national territories) and operated in the frequency band 4 800-4 990 MHz and; invited the 2023 World Radiocommunication Conference to consider, based on the results of the studies referred to in *invites the ITU Radiocommunication Sector*, possible measures to address, in the frequency band 4 800-4 990 MHz, protection of stations of the AMS and MMS located in international airspace and waters from other stations located within national territories and to review the pfd criteria in RR No. **5.441B**.

To that effect, ITU-R carried out necessary regulatory studies and technical studies in preparation of WRC-23, as detailed in section 3.3.1.

### 1/1.1/3.3.1 Summary of the results of studies in preparation of WRC-23

**Editor's note:** *This section can be amended noting the requirement of CPM23-1 that "This section should contain a summary of the technical and operational studies performed within ITU-R, including a list of relevant ITU-R Recommendations. Depending on the agenda item, this section could be divided in two parts, one part dealing with the summary and the other part dealing with the analysis."*

The term operation of vessels and aircrafts in *international waters* and *international airspace*, respectively, referred to in WRC-23 agenda item 1.1, is understood to mean that such operation would take place in an area which is outside the territory under jurisdiction of any administration.

There is a common understanding that no country has jurisdiction over the use of spectrum in international airspace/waters.

Regulatory studies were based on the analysis of various regulatory aspects such as:

- The analysis of the regulatory conditions for the protections of stations of the aeronautical mobile service, including analysis of mobile service allocations and their use for AMS applications in the 4 800-4 990 MHz band and the use of the bands for aeronautical mobile telemetry (AMT);
- Analysis of existing practice to protect stations in AMS in the *international airspace*;
- The analysis of the regulatory conditions for the protection of stations of the maritime mobile service.

Technical studies were studying the protection of AMS/MSS in *international airspace and waters*.

Preliminary draft new Report ITU-R M.[Conditions 1.1] contains the details of these regulatory and technical studies.

### 1/1.1/3.4 Analysis of the results of studies

**Editor's note:** *This section can be amended taking into account the requirement of CPM23-1 that "The results of the ITU-R studies should also be analysed with respect to the possible methods satisfying the agenda item".*

#### 1/1.1/3.4.1 Analysis of regulatory aspects

The studies revealed the variety of the regulatory situations which could be considered relevant to the discussion under this agenda item and which are addressed by the various regulatory provisions of the RR and other relevant regulation. Based on the above mentioned studies, the following aspects should be taken into account when making decision on WRC-23 agenda item 1.1.

a) Based on the AMS allocations in the Radio Regulations the question of potential protection of aeronautical stations in international airspace may only be discussed for the frequency bands 4 800-4 825 MHz and 4 835-4 950 MHz and not for the whole band 4 800-4 990 MHz (except in Region 2 (other than Brazil, Cuba, Guatemala, Mexico, Paraguay, Uruguay and Venezuela), and in Australia, where the frequency band 4 825-4 835 MHz is also allocated to the aeronautical mobile service, limited to aeronautical mobile telemetry for flight testing by aircraft stations.).

b) According to the provision in RR No. **8.1**, "The international rights and obligations of administrations in respect of their own and other administrations' frequency assignments shall be derived from the recording of those assignments in the Master International Frequency Register (the Master Register) or from their conformity, where appropriate, with a plan. Such rights shall be

conditioned by the provisions of these Regulations and those of any relevant frequency allotment or assignment plan.”

However, there is no specific notification and registration procedure in international airspace and waters for frequency assignments of AMS and MMS stations in this band pursuant to RR No. **11.14**. Such situation does not provide possibility to obtain international rights recognition in respect to frequency assignments of AMS and MMS stations in international airspace and waters and to claim protection against subsequent assignments from another country taking into account RR Article **8.1**, taking also into account that there is no frequency allotment or assignment Plan in the 4 800-4 990 MHz frequency band for the AMS nor for the MMS service.

Therefore, protection of AMS/MMS stations in international airspace/waters on the basis of registration of frequency assignments is not feasible. At the same time, it should be noted that AMS/MMS frequency assignments for coast and aeronautical stations can cover a service area which overlaps with international airspace/waters. For this case (such as in Figure 1 of Report ITU-R M.2119), application of RR No. **9.21** would enable the protection of AMS/MMS stations in the international airspace covered by the service area.

The inability to address protection of AMS/MMS stations in international airspace/waters via the registration procedure in accordance with RR Article **11.14** does not exclude the possibility of applying other mechanisms, through current and future provisions in the Radio Regulations.

c) It is observed that:

- There are examples of RR footnotes providing protection for services in international airspaces and waters, such as RR No. **5.502** and RR No. **5.509D** and;
- There are cases where no specific measures are provided to protect mobile service systems operated in international airspace or waters (e.g. all the bands identified for IMT except the band 4 800-4 990 MHz which is currently being studied under WRC-23 AI 1.1);
- There are cases wherein mobile service systems operated in international airspace or waters protect authorized stations operating within national territories. (e.g. ESV, IMT onboard vessels and aircrafts).

In several bands with IMT identification and aeronautical mobile service allocation in the Radio regulations, some administrations operate AMS services systems in accordance with the relevant Recommendations (ITU-R M.2114, ITU-R M.2115, etc.) and it is not clear whether the situations with the use of such bands may differ from one another.

This variety of situations is likely to reflect the differences of circumstances under which WRC have decided a new allocation or identification, based on the principle that incumbent services and applications have to be protected. In keeping with this principle, WRC-15 adopted RR No. **5.441B** and identified the frequency band 4 800-4 990 MHz, or portions thereof, for use by administrations wishing to implement International Mobile Telecommunications (IMT). RR No. **5.441B** establishes, among other conditions, a pfd limit applied to IMT in that frequency band as an additional measure to provide protection to AMS stations operating outside territorial waters of coastal states. Due to diverging views with respect to the relevance of the pfd criterion for the protection of AMS, its value, conditions of use and the frequency band within which the pfd limit would apply, WRC-15 invited ITU-R to conduct studies for technical and regulatory conditions for the use of this band for IMT, in order to protect AMS and review the pfd criterion in RR No. **5.441B** at WRC-19”.

d) RR No. **5.441B** provides a pfd limit, which is subject to review by WRC-23, applicable in the band 4 800-4 990 MHz based on assumptions relevant to AMS. In practice, the existing provisions of RR No. **5.441B** protects MMS operations in international waters. However, it should be confirmed, based on the studies under WRC-23 agenda item 1.1, whether specific measures are required for the protection of MMS in international waters, if any, also taking into account allocations in the various portions of the band.

The use of the band 4 800-4 990 MHz for the maritime mobile service (MMS) has not been considered until WRC-19. No studies with regard to compatibility between IMT and MMS had been conducted and MMS characteristics were not available. Some administrations informed they had MMS systems in operations but focused on studies for the protection of AMS, more sensitive to interference than MMS due to largest line of sight distances.

Development of technical and regulatory measures for the protection of the MMS in international waters, if necessary, required appropriate studies including those based on the ongoing revision of Recommendation ITU-R M.2116, which provides technical characteristics and protection criteria for the systems operating in the maritime mobile service within the 4 400-4 990 MHz frequency range.

#### 1/1.1/3.4.2 Analysis of the results of technical studies

**Editor's note:** This section contains analysis of the results of technical studies from the view of compatibility between AMS/MMS and IMT, including description of possible technical measures for protection. These measures should take into account the protection of AMS/MMS stations in international airspace and waters only.

Studies have estimated the single-entry pfd required to protect AMS and MMS systems for omnidirectional antennas and directive antennas. Results<sup>1</sup> are included in Tables **XX** and **YY**.

TABLE **XX**

Calculated pfd required to protect AMS systems for maximum receiving antenna gain direction

Parameter (unit)	AMS receiver antenna gain (dBi)		Power flux density (dB(W/(m <sup>2</sup> · MHz)))	
System 1 Airborne	3		-114.07	
System 2 Airborne	3		-114.07	
System 3 Airborne	3.5 (omni)	16 (directional)	-115.57 (omni)	-128.07 (directional)
System 3 Shipborne	3 (omni)	30 (directional)	-111.57 (omni)	-138.57 (directional)
System 4 Airborne	4.5 (omni)	16 (directional)	-116.57 (omni)	-128.07 (directional)
System 5 Airborne	3 (omni)	19 (directional)	-114.07 (omni)	-130.07 (directional)
System 5 Shipborne	3 (omni)	31 (directional)	-111.57 (omni)	-139.57 (directional)
System 6 Airborne 1	4.7		-113.27	
System 6 Airborne 2	4.7		-113.27	

<sup>1</sup> The pfd limits in Table XX and Table YY are derived using feeder loss of zero (0) dB.



Parameter (unit)	AMS receiver antenna gain (dBi)		Power flux density (dB(W/(m <sup>2</sup> · MHz)))	
System 6 Shipborne	6 (omni)	11.8 (directional)	-114.57 (omni)	-120.37 (directional)
System 7 Airborne 1	14		-122.57	
System 7 Airborne 2	14		-122.57	
System 8 Airborne	0		-105.57	
System 8 Shipborne	15		-124.57	

TABLE YY

**Calculated pfd required to protect MMS systems for maximum receiving antenna gain direction**

Parameter (Unit)	MMS receiver antenna gain (dBi)	Power flux density (dB(W/(m <sup>2</sup> · MHz)))
System 1 Shipborne	6	-114.57
System 2 Shipborne	15	-124.57

Some other studies have assessed the aggregation factor to be applied to derive a pfd limit per station in the case of omnidirectional antenna. The aggregation factor derived for AMS is 13.5 dB and for MMS 10 dB.

In a study on basic transmission loss between air borne station of the aeronautical mobile service and terrestrial base station it is observed that at specific separation distances between an airborne station and a terrestrial station, and at up to specific altitudes of the airborne station, the basic transmission loss can be high enough to meet the isolation needed to mitigate interference to the airborne station.

Another study presented a simulation of interference from IMT with AAS to AMS within the 4 800-4 990 MHz frequency band and estimated whether the required protection criteria of  $I/N = -6$  dB is met when AMS operated close to the territorial sea of a costal state. Based on the obtained results, it can be summarized that  $I/N$  threshold of AMS receivers will not be exceeded when interfered by IMT stations deployed in urban areas with 57 BS in each city (285 BS total) in accordance with simulation methodology of Recommendation ITU-R M.2101. The margins are from 5 to 25 dB for the case of the omnidirectional AMS receiver and from 11 dB to 35 dB for the directional AMS receiver.

Taking into account high margins of  $I/N$  this study concluded that no interference problems to AMS receivers are expected even for a worst-case scenario assumed in the study. The study noted that in practice, the AMS receiver would not operate at the border of the territorial seas and thus real margins would be significantly higher.

### 1/1.1/4 Methods to satisfy the agenda item

*[This section should contain the brief description of the Method or Methods to satisfy the agenda item as per section A2.4 of Annex 2 to [Resolution ITU-R 2-8.](#)]*

**Editors. note:** *In below methods considering protections of AMS it should be taken into account that based on the allocation to AMS in the Radio Regulations the protection of aeronautical stations only applies in the frequency bands 4 800-4 825 MHz and 4 835-4 950 MHz and not the whole band 4 800-4 990 MHz. It should also be taken into account that in Region 2 (except Brazil, Cuba, Guatemala,*

*Mexico, Paraguay, Uruguay and Venezuela), and in Australia, the frequency band 4 825-4 835 MHz is also allocated to the aeronautical mobile service, limited to aeronautical mobile telemetry for flight testing by aircraft stations.*

**Editor's note:** *Description and objectives of each method are required*

#### **1/1.1/4.1 Method A - NOC**

Under this method, the current regulatory conditions are considered sufficient “to address, in the frequency band 4 800-4 990 MHz, protection of the aeronautical mobile and maritime mobile services located in international airspace and waters” from IMT stations. The sentences in RR No. **5.441B** subjecting the pfd value to “review at WRC-23” and stipulating that “identification shall be effective after WRC-19.” are deleted. Consequential modifications are made to Resolution **223 (Rev.WRC-19)** to remove the reference to studies in preparation for WRC-23.

#### **1/1.1/4.2 Method B – Keeping the existing pfd and applying it to all countries listed in RR No. 5.441B**

Under this method the current regulatory conditions are considered sufficient “to address, in the frequency band 4 800-4 990 MHz, protection of the aeronautical mobile and maritime mobile services located in international airspace and waters” from IMT stations. The sentences in RR No. **5.441B** subjecting the pfd value to “review at WRC-23” and stipulating that “identification shall be effective after WRC-19.” are deleted. Consequential modifications are made to Resolution **223 (Rev.WRC-19)** to remove the reference to studies in preparation for WRC-23.

Under this method *resolves* 5 of Resolution **223 (Rev.WRC-19)**, is deleted thereby applying the pfd limit(s) to all countries listed in RR No. **5.441B**.

#### **1/1.1/4.3 Method C - New pfd value**

Under this method the current regulatory mechanisms of a pfd limit and application of No. **9.21** are considered appropriate “to address, in the frequency band 4 800-4 990 MHz, protection of the aeronautical mobile and maritime mobile services located in international airspace and waters” from IMT stations. The sentences in RR No. **5.441B** stating that “this pfd criterion is subject to review at WRC-23” and stipulating that “identification shall be effective after WRC-19” are deleted.

The current pfd value of  $-155 \text{ dB(W/(m}^2 \cdot 1 \text{ MHz))}$ , produced up to 19 km above sea level at 20 km from the coast, in RR No. **5.441B**, is replaced with a new pfd value of

*Option 1:* [TBD] based on the results of studies;

*Option 2:*  $-140 \text{ dB(W/(m}^2 \cdot \text{MHz))}$  for the protection of AMS produced up to 19 km above sea level at 20 km from the coast in the band 4 800-4 825 MHz and 4 835-4 950 MHz and  $-134 \text{ dB(W/(m}^2 \cdot \text{MHz))}$  for the protection of MMS produced up to 30 m above sea level at 20 km from the coast in the band 4 800-4 990 MHz.

*Option 3:*  $-117 \text{ dB(W/(m}^2 \cdot \text{MHz))}$  for the protection of AMS produced up to 19 km above sea level at 20 km from the coast in the band 4 800-4 825 MHz and 4 835-4 950 MHz and  $-115 \text{ dB(W/(m}^2 \cdot \text{MHz))}$  for the protection of MMS produced up to 30 m above sea level at 20 km from the coast in the band 4 800-4 990 MHz.

Consequential modifications are made to Resolution **223 (Rev.WRC-19)** to remove the reference to studies in preparation of WRC-23.

#### **1/1.1/4.4 Method D - New pfd value and applying it to all countries listed in RR No. 5.441B**

Under this method the current regulatory mechanisms of a pfd limit and application of No. **9.21** are considered appropriate “to address, in the frequency band 4 800-4 990 MHz, protection of the aeronautical mobile and maritime mobile services located in international airspace and waters” from IMT stations. The sentences stating that “this pfd criterion is subject to review at WRC-23” and stipulating that “identification shall be effective after WRC-19” are deleted.

The current pfd value of  $-155 \text{ dB(W/(m}^2 \cdot 1 \text{ MHz))}$ , produced up to 19 km above sea level at 20 km from the coast, in RR No. **5.441B**, is replaced with a new pfd value of

*Option 1:* [TBD] based on the results of studies;

*Option 2:*  $-140 \text{ dB(W/(m}^2 \cdot \text{MHz))}$  for the protection of AMS produced up to 19 km above sea level at 20 km from the coast in the band 4 800-4 825 MHz and 4 835-4 950 MHz and  $-134 \text{ dB(W/(m}^2 \cdot \text{MHz))}$  for the protection of MMS produced up to 30 m above sea level at 20 km from the coast in the band 4 800-4 990 MHz.

Consequential modifications are made to Resolution **223 (Rev.WRC-19)** to remove the reference to studies in preparation of WRC-23.

Under this method, *resolves* 5 of Resolution **223 (Rev.WRC-19)** is deleted, thereby applying pfd limit(s) to all countries listed in RR No. **5.441B**.

#### **1/1.1/4.5 Method E – No additional measures for protection of AMS/MMS stations in international airspace and waters**

Under this method no additional measures such as pfd limit are imposed on IMT stations for the protection of AMS/MMS stations in international airspace/waters. However, RR No. **9.21** would continue to apply, providing a mechanism for protection of AMS operations from IMT in areas up to 450 km around respective ground stations located in countries which authorized the use of AMS applications in question. This method corresponds to the existing regulatory practice implemented in the RR in other IMT bands and is considered to be sufficient.

The sentences stating that “this pfd criterion is subject to review at WRC-23” and stipulating that “identification shall be effective after WRC-19” are deleted.

Under this method, it is clarified in RR No. **5.441B** that “and IMT stations shall not claim protection from stations of the aeronautical mobile service” instead of “other applications of the mobile service”.

#### **1/1.1/4.6 Method F - Bilateral/multilateral coordination between concerned countries**

Under this method no additional measures such as pfd limit are imposed on IMT stations for the protection of AMS/MMS stations in international airspace/waters.

This method also envisages bilateral or multilateral agreements between concerned administrations providing specific technical measures such as pdf limit, geographical separation, frequency planning measures (e.g. a band segmentation), etc.

The Conference would invite ITU-R to develop appropriate ITU-R Recommendation(s) in order to facilitate sharing between IMT and AMS/MMS systems operating in international airspace and waters.

#### **1/1.1/5 Regulatory and procedural considerations**

[*Example(s) of regulatory text relating to the Method(s) to satisfy the agenda item.*]

**Editor's note:** *this section has not been fully reviewed and is subject to further review at the next meeting of WP 5D.*

**1/1.1/5.1 For all methods**

**ARTICLE 5**

**Frequency allocations**

**Section IV – Table of Frequency Allocations**  
(See No. 2.1)

**MOD**

**4 800-5 250 MHz**

Allocation to services		
Region 1	Region 2	Region 3
<b>4 800-4 990</b>	FIXED MOBILE 5.440A 5.441A MOD 5.441B 5.442 Radio astronomy 5.149 5.339 5.443	

**1/1.1/5.2 For Methods A and B**

**MOD**

**5.441B** In Angola, Armenia, Azerbaijan, Benin, Botswana, Brazil, Burkina Faso, Burundi, Cambodia, Cameroon, China, Côte d'Ivoire, Djibouti, Eswatini, Russian Federation, Gambia, Guinea, Iran (Islamic Republic of), Kazakhstan, Kenya, Lao P.D.R., Lesotho, Liberia, Malawi, Mauritius, Mongolia, Mozambique, Nigeria, Uganda, Uzbekistan, the Dem. Rep. of the Congo, Kyrgyzstan, the Dem. People's Rep. of Korea, Sudan, South Africa, Tanzania, Togo, Viet Nam, Zambia and Zimbabwe, the frequency band 4 800-4 990 MHz, or portions thereof, is identified for use by administrations wishing to implement International Mobile Telecommunications (IMT). 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. The use of IMT stations is subject to agreement obtained under No. **9.21** with concerned administrations, and IMT stations shall not claim protection from stations of other applications of the mobile service. In addition, before an administration brings into use an IMT station in the mobile service, in the frequency bands 4 800-4 825 MHz and 4 835-4 950 MHz, it shall ensure that the power flux-density (pfd) produced by this station does not exceed  $-155 \text{ dB(W/(m}^2 \cdot 1 \text{ MHz))}$  produced up to 19 km above sea level at 20 km from the coast, defined as the low-water mark, as officially recognized by the coastal State. Resolution **223 (Rev.WRC-23)** applies. (WRC-23)

**[Reasons: Studies have shown that the current pfd is sufficient.]**

### 1/1.1/5.3 For Methods C and D

#### MOD

**5.441B** In Angola, Armenia, Azerbaijan, Benin, Botswana, Brazil, Burkina Faso, Burundi, Cambodia, Cameroon, China, Côte d'Ivoire, Djibouti, Eswatini, Russian Federation, Gambia, Guinea, Iran (Islamic Republic of), Kazakhstan, Kenya, Lao P.D.R., Lesotho, Liberia, Malawi, Mauritius, Mongolia, Mozambique, Nigeria, Uganda, Uzbekistan, the Dem. Rep. of the Congo, Kyrgyzstan, the Dem. People's Rep. of Korea, Sudan, South Africa, Tanzania, Togo, Viet Nam, Zambia and Zimbabwe, the frequency band 4 800-4 990 MHz, or portions thereof, is identified for use by administrations wishing to implement International Mobile Telecommunications (IMT). 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. The use of IMT stations is subject to agreement obtained under No. **9.21** with concerned administrations, and IMT stations shall not claim protection from stations of other applications of the mobile service. In addition, before an administration brings into use an IMT station in the mobile service, it shall ensure that the power flux-density (pfd) produced by this station does not exceed [*Option 1: TBD*] [*Option 2: In the band 4 800-4 825 MHz and 4 835-4 950 MHz, -140 dB(W/(m<sup>2</sup> · 1 MHz)) produced up to 19 km above sea level and, in the band 4 800-4 990 MHz, -134 dB(W/(m<sup>2</sup> · 1 MHz)) produced up to 30 m above sea level, at 20 km from the coast, defined as the low-water mark, as officially recognized by the coastal State].*

[*Option 3: In addition, before an administration brings into use an IMT station in the mobile service, it shall ensure that the power flux-density (pfd) produced, in the frequency bands 4 800-4 825 MHz and 4 835-4 950 MHz, does not exceed -117 dB(W/(m<sup>2</sup> · 1 MHz)) produced up to 19 km above sea level at 20 km from the coast and, in the band 4 800 – 4 990 MHz, -115 dB(W/(m<sup>2</sup> · 1 MHz)) produced up to 30 m above sea level, at 20 km from the coast, defined as the low-water mark, as officially recognized by the coastal State.]*

Resolution **223 (Rev.WRC-19)** applies. (WRC-23)

### 1/1.1/5.4 For Method E

#### MOD

**5.441B** In Angola, Armenia, Azerbaijan, Benin, Botswana, Brazil, Burkina Faso, Burundi, Cambodia, Cameroon, China, Côte d'Ivoire, Djibouti, Eswatini, Russian Federation, Gambia, Guinea, Iran (Islamic Republic of), Kazakhstan, Kenya, Lao P.D.R., Lesotho, Liberia, Malawi, Mauritius, Mongolia, Mozambique, Nigeria, Uganda, Uzbekistan, the Dem. Rep. of the Congo, Kyrgyzstan, the Dem. People's Rep. of Korea, Sudan, South Africa, Tanzania, Togo, Viet Nam, Zambia and Zimbabwe, the frequency band 4 800-4 990 MHz, or portions thereof, is identified for use by administrations wishing to implement International Mobile Telecommunications (IMT). 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. The use of IMT stations in the frequency bands 4 800-4 825 MHz and 4 835-4 950 MHz is subject to agreement obtained under No. **9.21** with concerned administrations, and IMT stations shall not claim protection from stations of aeronautical mobile service. Resolution **223 (Rev.WRC-23)** applies. (WRC-23)

[**Reasons: TBD**]

**1/1.1/5.5 For Method F**

**MOD**

**5.441B** In Angola, Armenia, Azerbaijan, Benin, Botswana, Brazil, Burkina Faso, Burundi, Cambodia, Cameroon, China, Côte d'Ivoire, Djibouti, Eswatini, Russian Federation, Gambia, Guinea, Iran (Islamic Republic of), Kazakhstan, Kenya, Lao P.D.R., Lesotho, Liberia, Malawi, Mauritius, Mongolia, Mozambique, Nigeria, Uganda, Uzbekistan, the Dem. Rep. of the Congo, Kyrgyzstan, the Dem. People's Rep. of Korea, Sudan, South Africa, Tanzania, Togo, Viet Nam, Zambia and Zimbabwe, the frequency band 4 800-4 990 MHz, or portions thereof, is identified for use by administrations wishing to implement International Mobile Telecommunications (IMT). 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. The use of IMT stations in the frequency bands 4 800-4 825 MHz and 4 835-4 950 MHz is subject to agreement obtained with neighbouring countries or concerned administrations, and IMT stations shall not claim protection from stations of other applications of the mobile service. Resolution 223 (Rev.WRC-19) applies.

*[Editor's note: modification of RR No. 5.441B to be provided]*

**1/1.1/5.6 For Methods A, B, C and D**

**MOD**

**RESOLUTION 223 (REV.WRC-23)**

**Additional frequency bands identified for International  
Mobile Telecommunications**

The World Radiocommunication Conference ([Abu Dhabi or Dubai], 2023),

[...]

*resolves*

1 to invite administrations planning to implement IMT to make available, based on user demand and other national considerations, additional frequency bands or portions of the frequency bands above 1 GHz identified in Nos. **5.341B**, **5.384A**, **5.429B**, **5.429D**, **5.429F**, **5.441A** and **5.441B** for the terrestrial component of IMT; due consideration should be given to the benefits of harmonized utilization of the spectrum for the terrestrial component of IMT, taking into account the services to which the frequency band is currently allocated;

2 to acknowledge that the differences in the texts of Nos. **5.341B**, **5.384A** and **5.388** do not confer differences in regulatory status;

3 that in the frequency bands 4 800-4 825 MHz and 4 835-4 950 MHz, in order to identify potentially affected administrations when applying the procedure for seeking agreement under

No. **9.21** by IMT stations in relation to aircraft stations, a coordination distance from an IMT station to the border of another country equal to 300 km (for land path)/450 km (for sea path) applies;

4 that in the frequency band 4 800-4 990 MHz, in order to identify potentially affected administrations when applying the procedure for seeking agreement under No. **9.21** by IMT stations in relation to fixed-service stations or other ground-based stations of the mobile service, a coordination distance from an IMT station to the border of another country equal to 70 km applies,

[*Method A and C: 5* that the power flux-density (pfd) limits in No. **5.441B**, which is subject to review at WRC-23, shall not apply to the following countries: Armenia, Brazil, Cambodia, China, Russian Federation, Kazakhstan, Lao P.D.R., Uzbekistan, South Africa, Viet Nam and Zimbabwe,][*Method B and D:.*]

*invites the ITU Radiocommunication Sector*

1 to conduct compatibility studies in order to provide technical measures to ensure coexistence between the MSS in the frequency band 1 518-1 525 MHz and IMT in the frequency band 1 492-1 518 MHz, including guidance on the implementation of frequency arrangements for IMT deployment in the frequency band 1 427-1 518 MHz, taking into account the results of these studies;

2 to continue providing guidance to ensure that IMT can meet the telecommunication needs of developing countries and rural areas;

3 to include the results of the studies mentioned in *invites the ITU Radiocommunication Sector* above in one or more ITU-R Recommendations and Reports, as appropriate.

**[Reasons: Consequential modification to satisfy the agenda item.]**

**1/1.1/5.7 For Method E**

**MOD**

## RESOLUTION 223 (REV.WRC-23)

### **Additional frequency bands identified for International Mobile Telecommunications**

*[Editor's note: modification Resolution 223 (Rev.WRC-19) to be provided]*

**1/1.1/5.8 For Method F**

**MOD**

## RESOLUTION 223 (REV.WRC-23)

### **Additional frequency bands identified for International Mobile Telecommunications**

**[Editor's note: modification Resolution 223 (Rev.WRC-19) to be provided]**

