PREPARATIONS FOR WRC-23

Agenda items 1.1, 1.2 and RR No. 21.5

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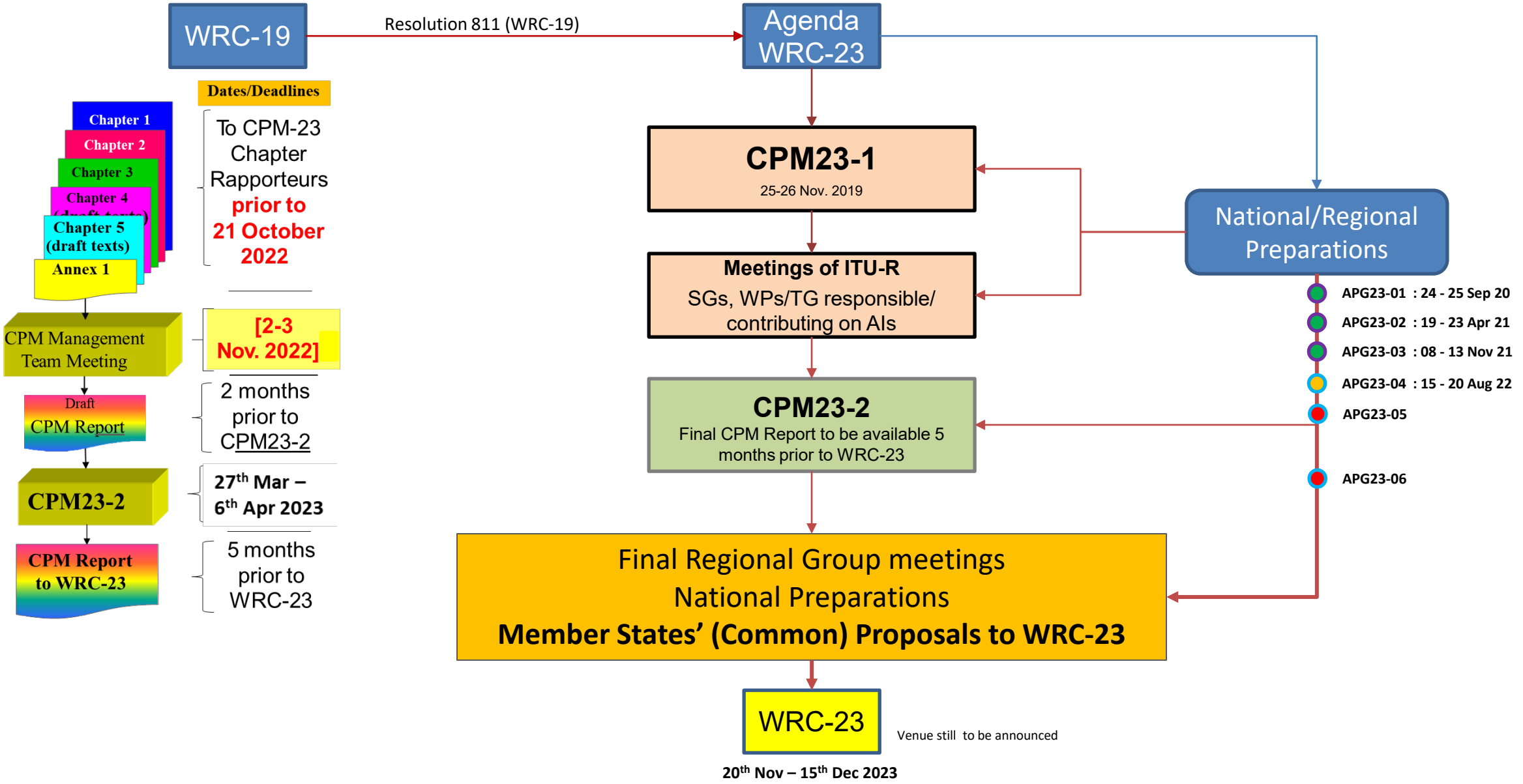
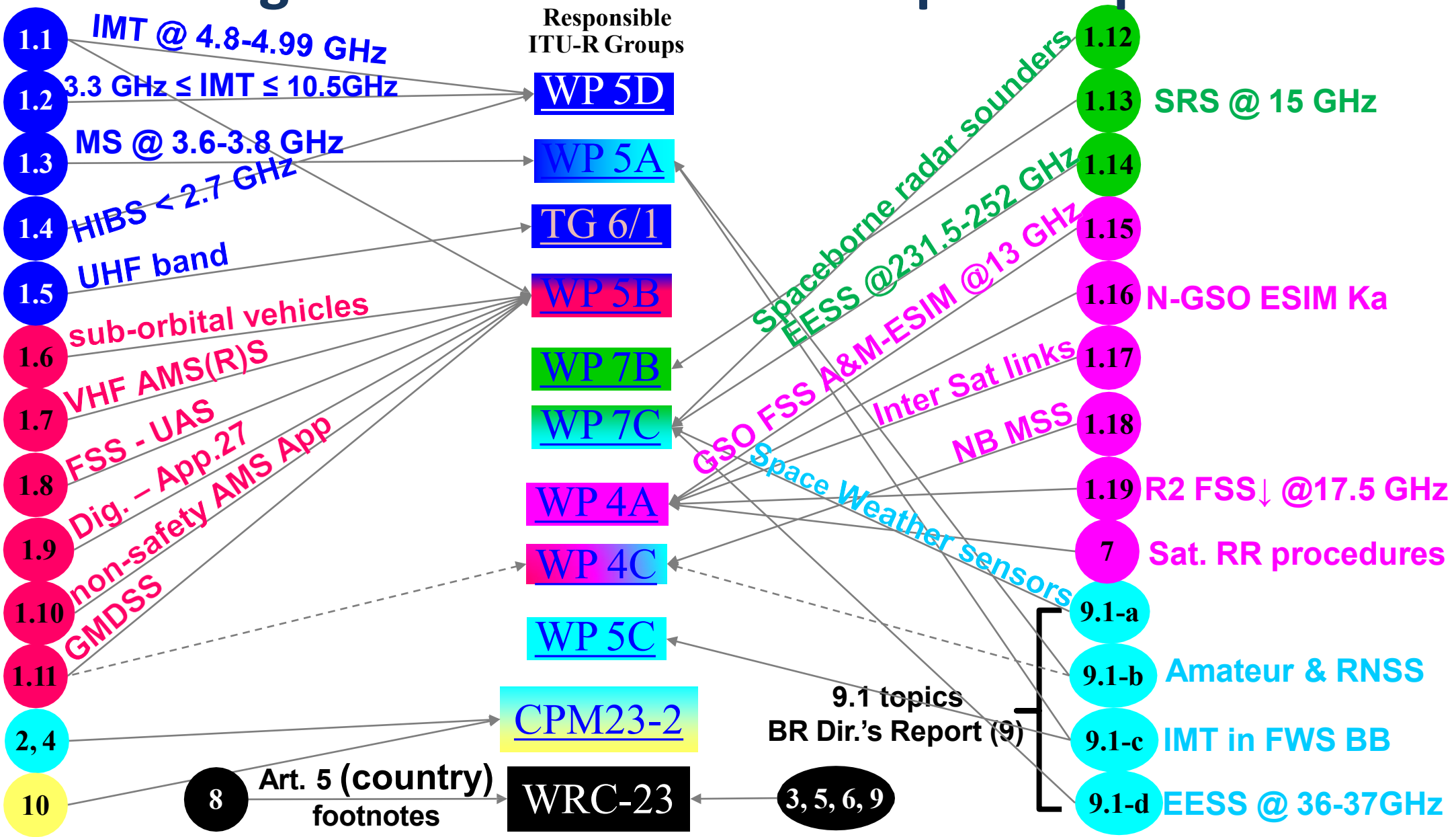
Main Steps towards WRC-23



APG23 : Structure

Working Party	Assigned Agenda Items	Working Party Chairman
WP1: Fixed, Mobile and Broadcasting Issues	1.1, 1.2, 1.3, 1.4, 1.5, 9.1 (Topic c) Res. 175 (WRC-19) and RR. No. 21.5 *Note: For AI1.1 WP1 would be responsible for APG preparation in close collaboration with WP2*	Co-Chairmen: Dr. Hiroyuki Atarashi (Japan) *(Email: hiroyuki.atarashi.yt@nttdocomo.com)* Dr. Jae Woo Lim (Rep. of Korea) *(Email: jwlim@korea.kr)*
WP2: Aeronautical and Maritime Issues	1.6, 1.7, 1.8, 1.9, 1.10, 1.11 and Res.427 (WRC-19)	Mr. Bui Ha long (Viet Nam) *(Email: Longbh@rfd.gov.vn)*
WP3: Science Issues	1.12, 1.13, 1.14, 9.1 (Topics: a) Res. 657 (Rev.WRC-19), d) WRC-19 Doc. 535, 2nd section of the Annex) and Res. 655 (WRC-15)	Mr. Wahyudi Hasbi (Rep. of Indonesia) *(Email: wahyudi.hasbi@lapan.go.id)*
WP4: Satellite Issues	1.15, 1.16, 1.17, 1.18, 1.19 & 7	Co-Chairmen: Ms. Fenhong Cheng (People's Rep. of China) *(Email: chengfenhong@chinasatcom.com)* Mr. Mrunmaya Pattanaik (India) *(Email: mailto:pattanaik.mr@gov.in)*
WP5: General Issues	2, 4, 8, 9.1 (Topic: b) Res. 744 (WRC-19)), and 10	Dr. Taghi Shafiee (Islamic Rep. of Iran) *(Email: shafiee@cra.ir)*

WRC-23 agenda items & ITU-R Resp. Groups

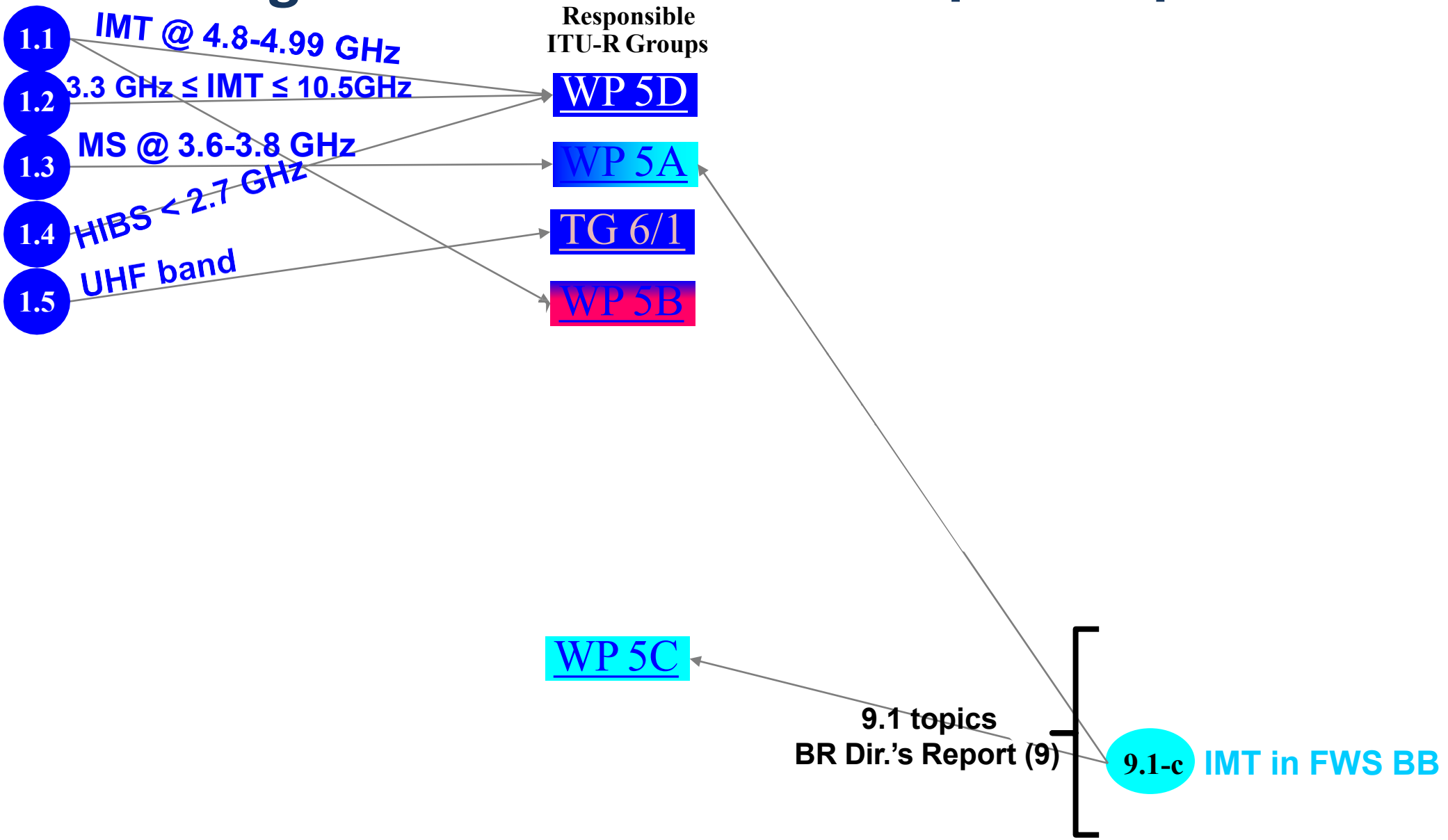


(see Annexes 4, 7 and 10 to CA/251)

+Studies to be reported directly to the BR Director by: (see CA/251 Annex 4)

- **WP 5D** on No. **21.5** limit
- **WP 5B** on Res. **427 (WRC-19)**

WRC-23 agenda items & ITU-R Resp. Groups



+Studies to be reported directly to the BR Director by:
(see CA/251 Annex 4)

- **WP 5D** on No. **21.5** limit

WRC-23 Agenda items on Fixed, Mobile & Broadcasting issues

WRC-23 Preparation

DG	WRC-23 Agenda Items
DG AI 1.1	Review of RR No. 5.441B regarding IMT identification in 4 800-4 990 MHz
DG AI 1.2	IMT identification in 3 300-3 400 MHz for amending the Footnote in Region 1
DG AI 1.2	IMT identification in 3 300-3 400 MHz for Region 2
DG AI 1.2	IMT identification in 3 600-3 800 MHz for Region 2
DG AI 1.2	IMT identification in 6 425-7 025 MHz for Region 1
DG AI 1.2	IMT identification in 7 025-7 125 MHz globally
DG AI 1.2	IMT identification in 10.0-10.5 GHz for Region 2
DG RR21.5	Studies on RR No. 21.5

Agenda item 1.1

1.1 : In the band **4 800-4 990 MHz**, consider the pfd criteria in No. 5.441B for the protection of stations of the aeronautical and maritime mobile services located in international airspace and waters from other stations located within national territories ► Res. 223 (Rev.WRC-19)

- **Background** :
  - As invited by WRC 15, vide Resolution 223 (Rev.WRC-15), ITU-R carried out studies but did not finalize conditions
  - Accordingly, WRC-19 updated footnote RR No. 5.441B and Resolution 223 (Rev.WRC-19)
  - As a result, additional countries included in IMT identification in footnote RR No. 5.441B
  - Now footnote includes 40 countries
  - For 11 of these countries the pfd criterion in footnote RR No. 5.441B deactivated
    - (*resolves 5* of Resolution 223 (Rev.WRC-19)
  - Due to diverging views on application of pfd criterion, with AI 1.1 WRC-23 is invited to review pfd criterion
- **Status** :
  - China and Russia : No protection to AMS and MMS in international space and waters
  - France and US : To protect AMS and MMS add regulatory conditions
  - WP5B LS to WP5D : Updation of M.2116 on AMS and MMS technical parameters and protection criteria is still ongoing.
- **Studies still not concluded and strong diverse views still exist, to be discussed in June 2022 meeting of WP5D**
- **CPM text is still in initial stages**
- **Methods to satisfy this agenda item still not decided**

Agenda item 1.2

Background

1.2 : Consider the identification for IMT of the following frequency bands:
3 300-3 400 MHz (R1 & R2), **3 600-3 800 MHz** (R2), **6 425-7 025 MHz** (R1), **7 025-7 125 MHz** (globally) and **10.0-10.5 GHz** (R2)► Res. 245 (WRC-19)

- **3 300-3 400 MHz (R1, R2)** : Primary allocation is RLS and adjacent bands allocated to the FS, FSS, MS, RLS
- **3 600-3 800 MHz (R2)** : Primary allocation is FS, FSS, MS and adjacent bands allocated to the FS, FSS, MS
- **6 425-7 025 MHz (R1) :**
  - **6 425-6 700 MHz** : FS, MS and FSS (E-to-s)
  - **6 700-7 025 MHz** : FS, MS, and FSS (E-to-s)/(s-to-E)
  - **Note : FSS (E-to-s) in 6 725-7 025 MHz** to be in accordance with Appendix **30B**
  - Adjacent bands allocated to FS, FSS, MS
- **7 025-7 125 MHz (R1, R2, R3) :**
  - **7 025-7 075 MHz** : FS, MS, and FSS (E-to-s)/(s-to-E)
  - **7 075-7 125 MHz** : FS, MS
  - Adjacent bands allocated to FS, FSS, MS, SOS, SRS (deep space)
- **10.0-10.5 GHz (R2) :**
  - **10.00-10.40 GHz** : EESS (active), RLS
  - **10.40-10.50 GHz** : RLS
  - Adjacent bands allocated to EESS (active), EESS (passive), FS, MS, RLS

Sharing Studies Review: AI 1.2

Spectrum band	3300-3800 MHz	6 425-7 125 MHz	10-10.5 GHz
Sharing studies with incumbent services	**FSS (3 400-4 200 MHz)** • China: Supports IMT. Separation distance for urban and suburban. • Ericsson: Supports IMT. Separation distance ~30 km. • GSOA: No to IMT. Separation distance ~500 km • Nokia: Supports IMT. Separation distance ~30 km. **RLS (3 100-3 400 MHz):** • USA: No to IMT~300 km protection distance for airborne radar • USA: No to IMT. Updated study shows very large separation distance • France: New study with airborne radars. No results yet **FS (3 600-3 800 MHz):** • China: Supports IMT. Separation distance for urban and suburban. • GSMA: Supports IMT. Separation distance in 10s of km.	**FSS (6 425-7 125 MHz)** • Japan: Supports IMT (above 7 025 MHz). Margin of 11.7 dB and 8.9 dB for Carrier 1 & 2 • Russia: Supports IMT. Interference margin >10 dB. • Russia: No to IMT. C/I exceeded for SOS (E2S) by 9 dB. Only applicable >7100 MHz • KSA, Jordan: No to IMT. FSS (E2S) exceeds for low elevation angles. • Ericsson: Supports IMT. For S2E subarray model reduces separation distances . • Ericsson: Supports IMT. For E2S using subarray model increases I/N in some cases, but still margins. • GSOA: No to IMT. FSS (S2E) requires up to 500 km separation distance • France: Neutral. FSS (E2S) with slight exceedance for P.2108. • France: Neutral. Protection distances for FSS feeder downlink earth stations up to 10s of km. • Benin, Burkina Faso, Côte d'Ivoire, Ghana, Guinea, Mali, etc.: No to IMT. No update, reiterating App 30B of RR • Nokia: Supports IMT. FSS (S2E) < 26 km separation distance • Nokia: Supports IMT. FSS (E2S) 10 dB margin • Kuwait, UAE: Supports IMT. FSS (E2S) margin > 6.2 dB **Space Research (7 145-7 190 MHz)** • GSMA: Supports IMT. Updated study. Still a very large margin and no compatibility problem	**RLS (10-10.5 GHz)** • USA: No to IMT. Additional aggregate interference analysis • China: No to IMT. Airborne radar. Up to >20 dB isolation required for some airborne radars. • Brazil: Supports IMT. If sidelobe suppression is used for airborne • Brazil: Supports IMT. For ground based and shipborne with separation distance 13, 31 km • France: No to IMT. Separation distance of 168km airborne **Active EESS (10-10.4 GHz)** • Germany: No to IMT. Interference to synthetic aperture radar (SAR) exceeds threshold >10 dB. • Canada: No to IMT. Exceeded by 11dB, updated study with randomization of EESS angle. • China: Supports IMT. Updated Monte Carlo simulation **Passive EESS (10.6-10.7 GHz)** • China: Supports IMT. Added composite antenna pattern, still with margin for all sensors. • Brazil: Supports IMT. Assuming sidelobe suppression

Agenda item 1.2

Draft CPM Text

General Agreement : Each frequency band to have its own set of Methods to satisfy the respective part of the agenda

3 300-3 400 MHz (**R1**)

Method 1A : No change to the RR in 3 300-3 400 MHz in **R1** except suppression of Resolution **245** (**WRC-19**)

Method 1B : Modify existing footnotes RR No. **5.429A** and RR No. **5.429B** to add interested **R1** countries for allocation of the band to the mobile service (except aeronautical) on a primary basis and to identify the band for IMT in those countries

Method 1C : Modify existing footnotes RR No. **5.429A** and RR No. **5.429B** including the revision of given conditions and to add interested **R1** countries for allocation of the band to the mobile service (except aeronautical) on a primary basis and to identify the band for IMT in those countries

Method 1D : Primary allocation of mobile service (except aeronautical mobile) in interested **R1** countries and identification of IMT through a new footnote

View 1: This method is in contradiction with Resolution **245** (**WRC-19**) which refers only to amending existing footnote

View 2: This method is aligned with the results of the studies and coexistence is feasible and accordingly the conditions in existing footnotes are not required

Method 1E : Primary allocation to the mobile service (except aeronautical mobile) by adding the band in the Table of Allocations for **R1** and identification to IMT by modification of RR No. **5.429B** to apply to **R1**, and any consequent modifications to RR No. **5429A**

View 1: This needs to be further discussed and analyzed to be consistent with RR **Article 5** and the Table of Frequency Allocations

View 2: This method is in contradiction with Resolution **245** (**WRC-19**) which refers only to amending existing footnote

View 3: This method is aligned with the results of the studies and coexistence is feasible and accordingly the band is proposed to be allocated to the mobile service on a primary basis in **R1**, noting that conditions in existing footnotes are not required

Agenda item 1.2

Draft CPM Text

Discussion and agreement on Methods to satisfy the respective part of the agenda for following bands is still not finalized

3 300-3 400 MHz (**R2**)

Method 2A : No change to the RR in 3 300-3 400 MHz in **R2** except suppression of Resolution **245** (**WRC-19**)
Method 2B : Upgrade the secondary mobile allocation to primary and identify for IMT

3 600-3 800 MHz (**R2**)

Method 3A : No change to the RR in 3 300-3 400 MHz in **R2** except suppression of Resolution **245** (**WRC-19**)
Method 3C : Identify the frequency band, or portions thereof, for IMT

Option 1: In **R2**, identify 3 600-3 800 MHz, or portions thereof, for IMT without any additional conditions. Conditions applicable to the MS in the frequency band equally apply to IMT. Stations of the mobile service, including IMT systems, in the band 3 600-3 800 MHz shall not claim more protection from space stations than that provided in **Table 21-4** of the RR

Option 2: In **R2**, identify 3 600-3 800 MHz, or portions thereof, for IMT, together with technical and regulatory conditions in a footnote including the application of RR Nos. **9.17**, **9.18**, [**9.21**,] RR **Table 21-4** limits, and pfd limits for the MS/IMT

Option 3: Expand RR No. **5.434** to **R2**, while maintaining the rest of RR No. **5.434** unchanged

Option 4: Add the name of countries to RR No. **5.434**, maintaining the rest of RR No. **5.434** unchanged

Agenda item 1.2

Draft CPM Text

Discussion and agreement on Methods to satisfy the respective part of the agenda for following bands is still not finalized

6 425-7 025 MHz (**R1**)

Method 4A : No change to the RR in 6 425-7 025 MHz in **R1** except suppression of Resolution **245** (**WRC-19**)
Method 4C : Identify the frequency band, or portions thereof, for IMT

Option 1: Identify 6 425-7 025 MHz for IMT without any additional conditions

Option 2: This method proposes to identify the frequency band 6 425-7 025 MHz in **R1**, or portions thereof, for IMT by creating a new RR No. **AI124A**

7 025-7 125 MHz (**Global**)

Method 5A : No change to the RR in 7 025-7 125 MHz except suppression of Resolution **245** (**WRC-19**)
Method 5C : Identify the frequency band, or portions thereof, for IMT

Option 1: Identify 7 025-7 125 MHz for IMT without any additional conditions

Option 2: This method proposes to identify the frequency band 7 025-7 125 MHz, or portions thereof, for IMT, by creating a new RR No. **AI125A**

10.0-10.5 GHz (**R2**)

Method 6A : No change to the RR in 10.0-10.5 GHz in **R2** except suppression of Resolution **245** (**WRC-19**)
Method 6B : Allocate the band to mobile service in **R2** and identify for IMT

RR 21.5

Studies to be Reported Directly to the BR Director

21.5 : ITU-R is invited to study, as a matter of urgency, the **applicability of the limit specified in No. 21.5 of the Radio Regulations to IMT stations, that use an antenna that consists of an array of active elements**, with a view to recommend ways for its possible replacement or revision for such stations, as well as any necessary updates to Table 21-2 related to terrestrial and space services sharing frequency bands. Furthermore, the ITU-R is invited to study, as a matter of urgency, verification of No. 21.5 regarding the notification of IMT stations that use an antenna that consists of an array of active elements, as appropriate.
(WRC-19 Document 550)

- Responsible Group: WP 5D
- Working document : WP5D/1155-N19
- Different approaches
- Change in title of the Working document
- Discussion on possible RR modifications to be considered by WRC-23 in line with CPM text

RR 21.5

Approach 1

- **Approach 1 : TRP with a reference bandwidth**
  - Study 1: TRP with a reference bandwidth of 200 MHz
  - Study 2: TRP with a reference bandwidth of 1 MHz
  - Study 3: TRP with a reference bandwidth of up to a few tens of MHz, such as 28 or 56 MHz
  - Study 4: Gradual consideration to implement Approach 1: TRP over bandwidth

RR 21.5

Approach 2

- **Approach 2 : Conducted power delivered by a single transmitter and no change in text of RR No. 21.5**
  - Study A : “Power delivered by a Tx to antenna of a station” is interpreted as power delivered by a single transceiver to antenna of an IMT station
  - Study B : For notification of IMT stations with AAS, the notification should follow the same process as in RR Appendix 4 Table 1
  - Study C : No changes are necessary to RR No. 21.5 when considering IMT stations that use an antenna that consists of an array of active elements for the band 24.45 27.5 GHz. Furthermore, there is no need to provide any additional information for the notification of IMT stations that use an antenna that consists of an array of active elements given the data items already provided in RR Appendix 4 (i.e. data item 8B)
  - Study D : For IMT stations using an antenna that consist of an array of active elements, “the power delivered by a transmitter to the antenna of a station” is the power delivered by a single transmitter to the antenna of an IMT station
  - Study E : Protection of space receivers is ensured by RR No. 21.3, which sets the radiated power limit of the entire terrestrial station. 8AA for AAS of a BS station can be provided by TRP value of the entire station

    $$\text{TRP (dBW)} - 10\log_{10}(\text{\# of transmitters at the station}) \text{ (dB)} + L \text{ (dB)} \leq 10 \text{ (dBW)}$$

  - Study G : Impact on existing and future developments of IMT from altering the application of the limit in RR No. 21.5 to be that of the TRP of the station instead of the conducted power of a transmitter
  - Study H : Process of notification of IMT stations includes declaration of several station parameters including transmitter conducted output power (8AA). Stations operating on the same frequency assignment could be notified separately when one or more other parameters vary. Therefore, RR No. 21.5 simply applies to the entry for the conducted power of each transmitter output power irrespective of the frequency assignment.

RR 21.5

Approach 3

- **Approach 3 :**

Some administrations have a view that some provisions of RR Article 21 relating to terrestrial services may benefit from further studies and possible revision by a future WRC

  - For example, some provisions in RR Article 21 contain absolute power values and would be more meaningful if they were expressed in terms of a reference bandwidth

Next WP5D meeting (Hybrid) : 13-24 June 2022
Next APG23-04 meeting (Hybrid) : 15-20 Aug 2022

Thank You