ITU Structure and preparation on WRC-19 Agenda Items

Pacific Radiocommunication Workshop 2018 (PRW-18)
04 – 06 Sep 2018
Honiara, Solomon Islands

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CELEBRATING 25 YEARS OF ACHIEVEMENTS

AGENDA

- ITU and its structure
- Recalling WRC-15 outcomes
- Preparatory work towards WRC-19
- Going forward towards WRC-19

ITU at a Glance

Specialized Agencies of the United Nations

WHO ILO UPU ICAO WMO IMO IAEA

WB UNWTO FAO IFAD UNIDO WIPO WFP IMF

Specialized UN agency with focus on Telecommunication / ICTs

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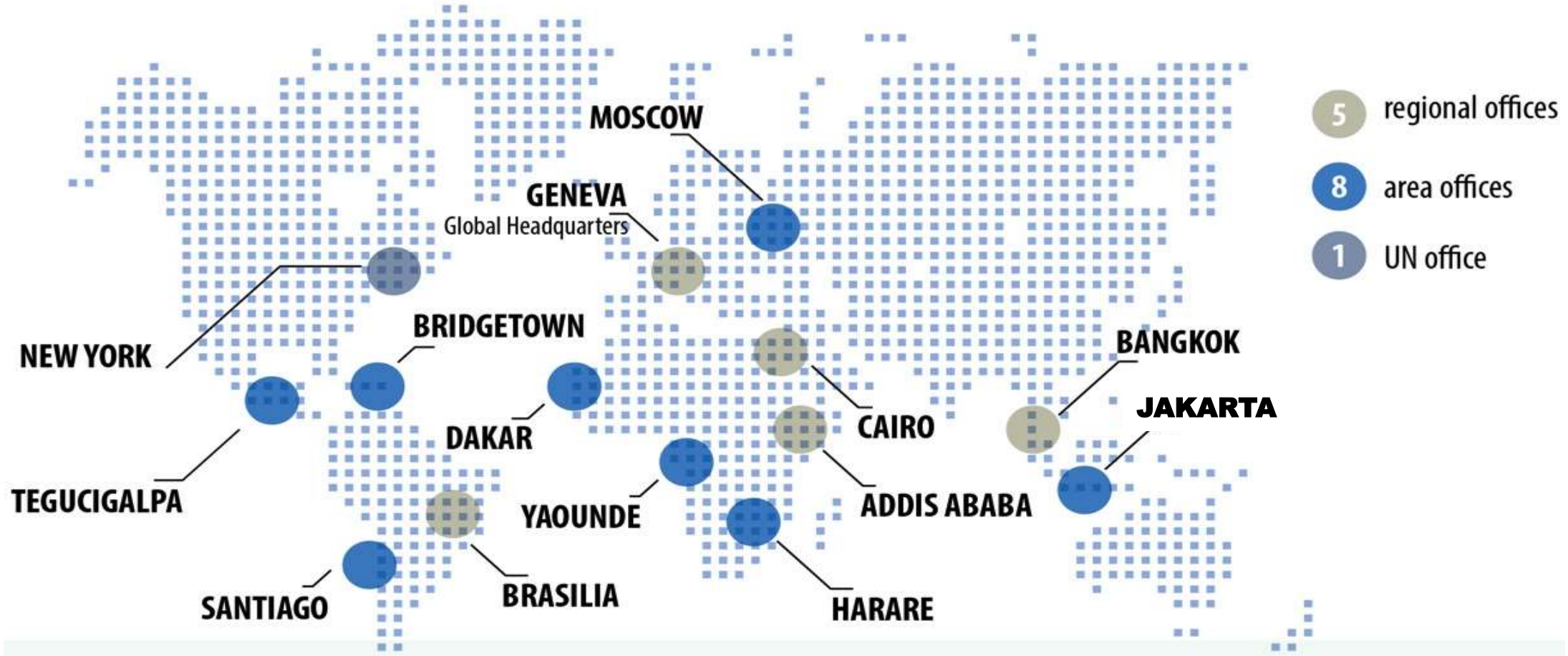
ITU Presence



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ITU – Our strength

Our numbers

193

MEMBER STATES

>700

PRIVATE SECTOR ORGANIZATIONS

>100

ACADEMIA MEMBERS

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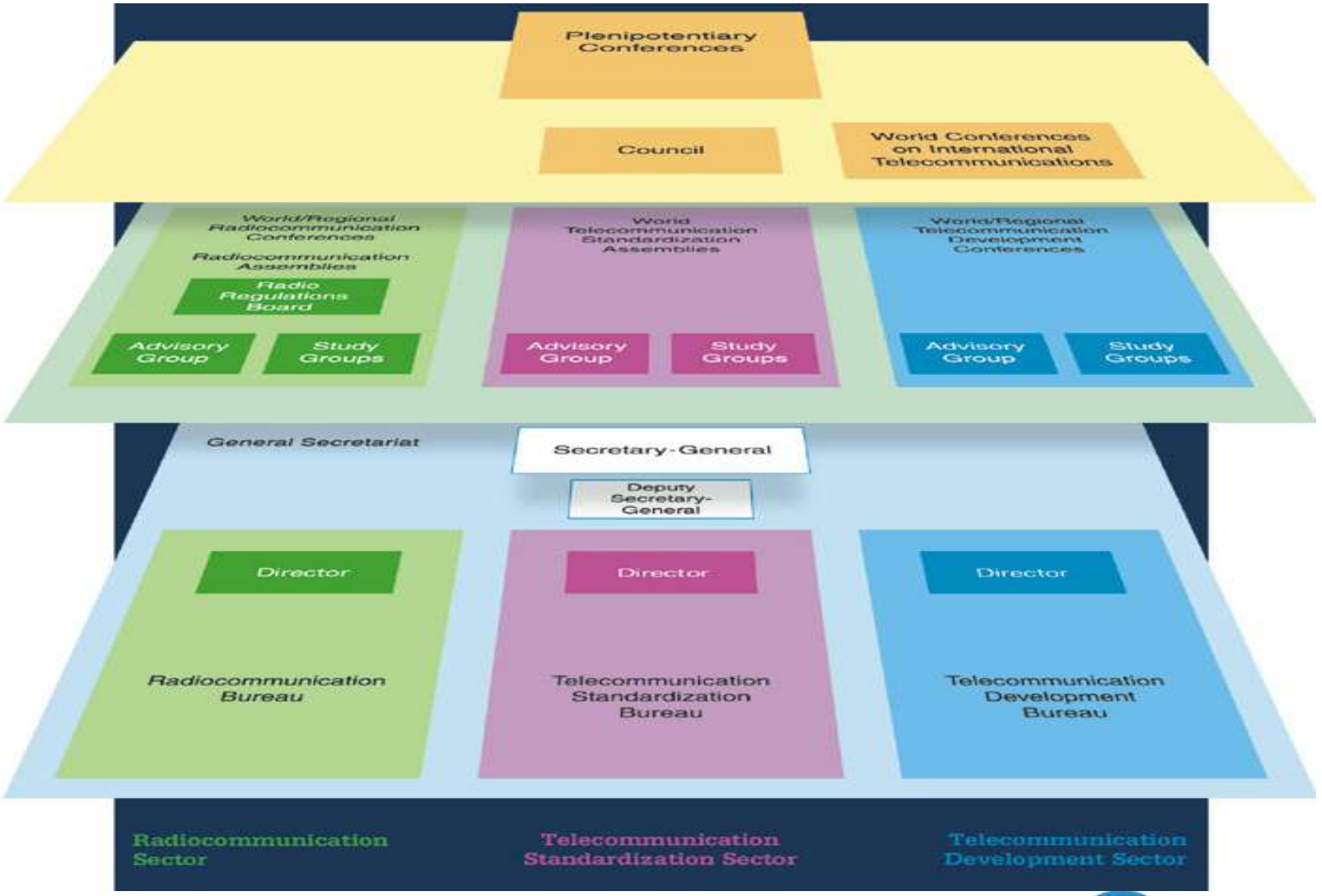
ITU – Organization

Each sector has separate mandate, but all work cohesively towards connecting the world



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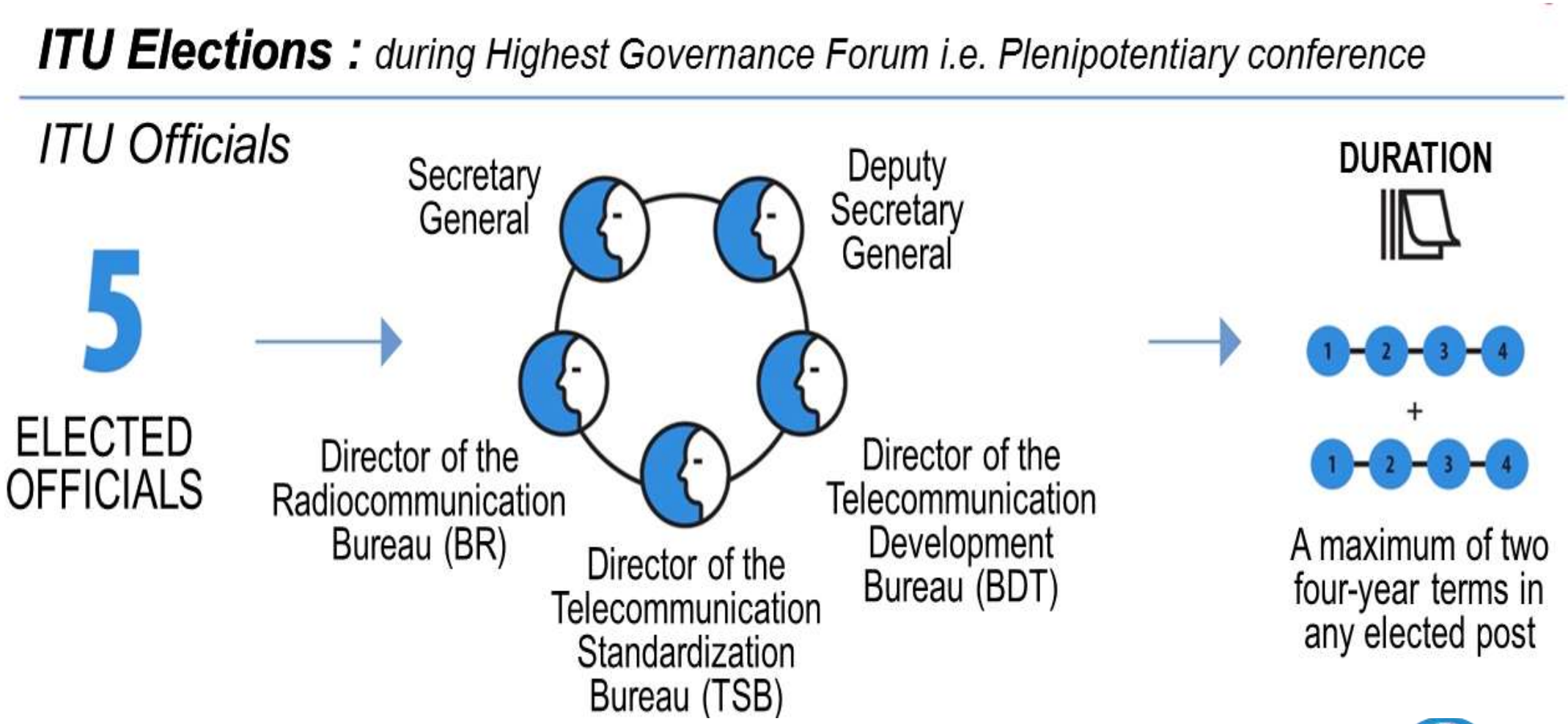

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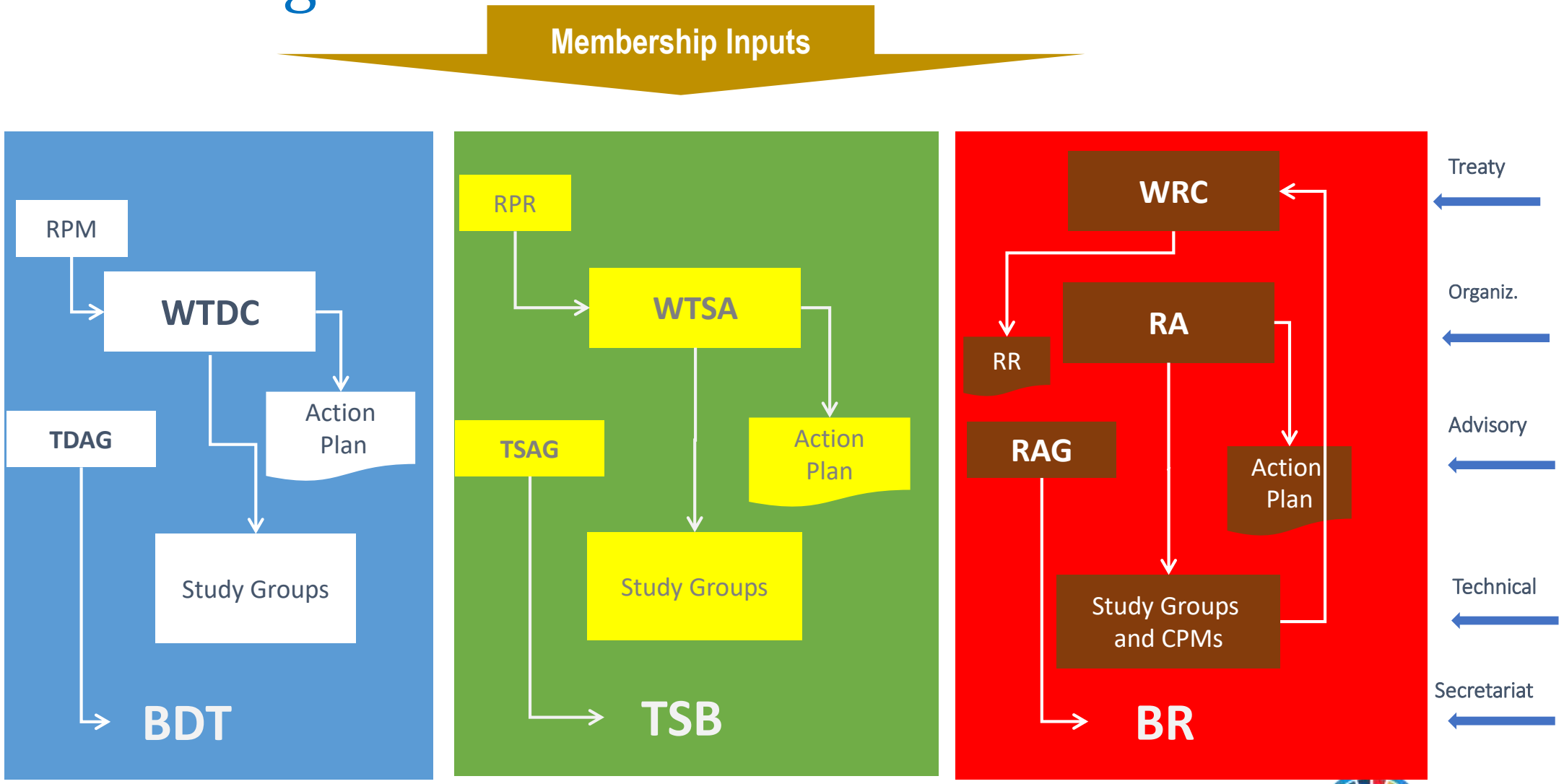

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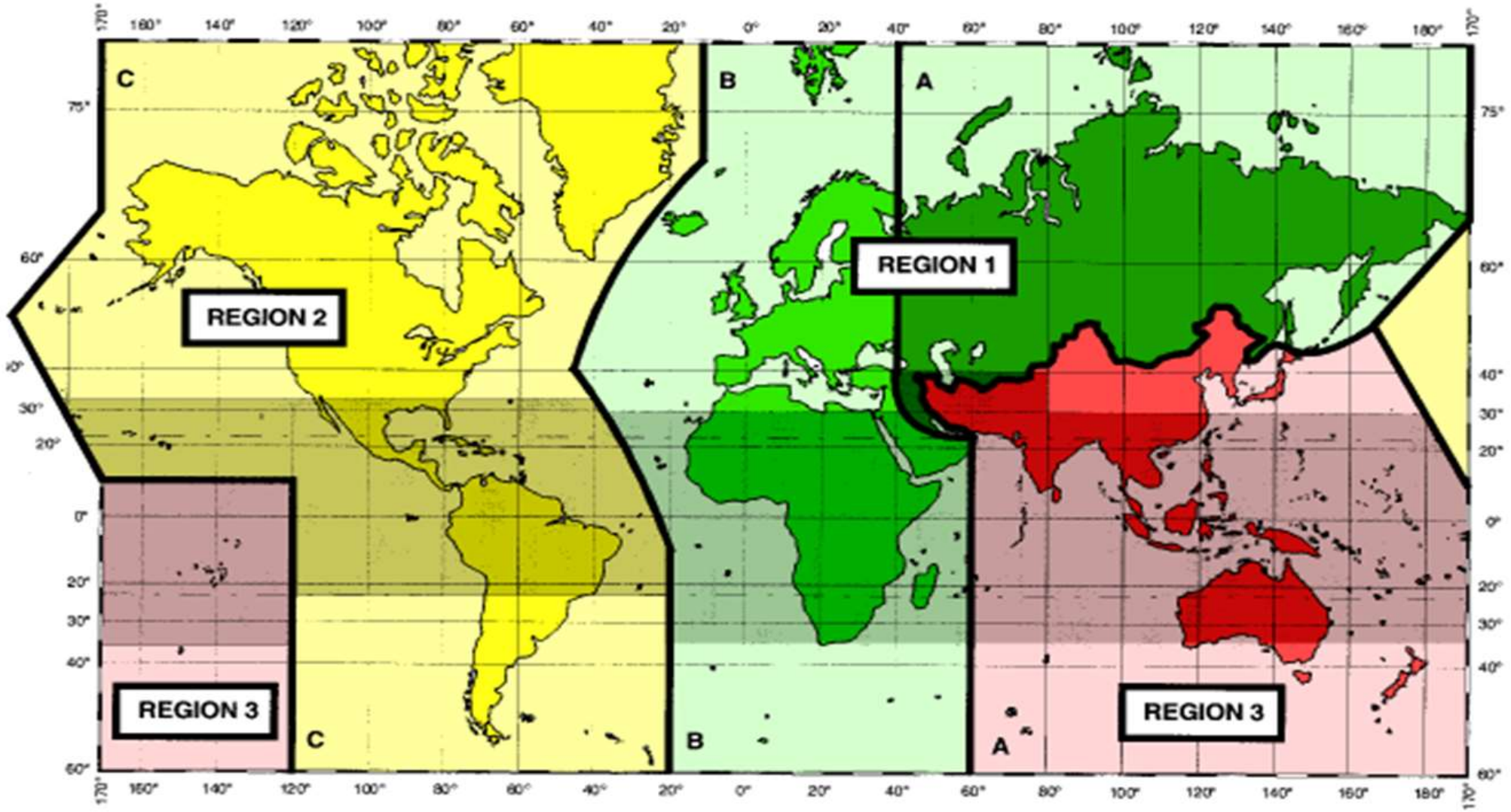
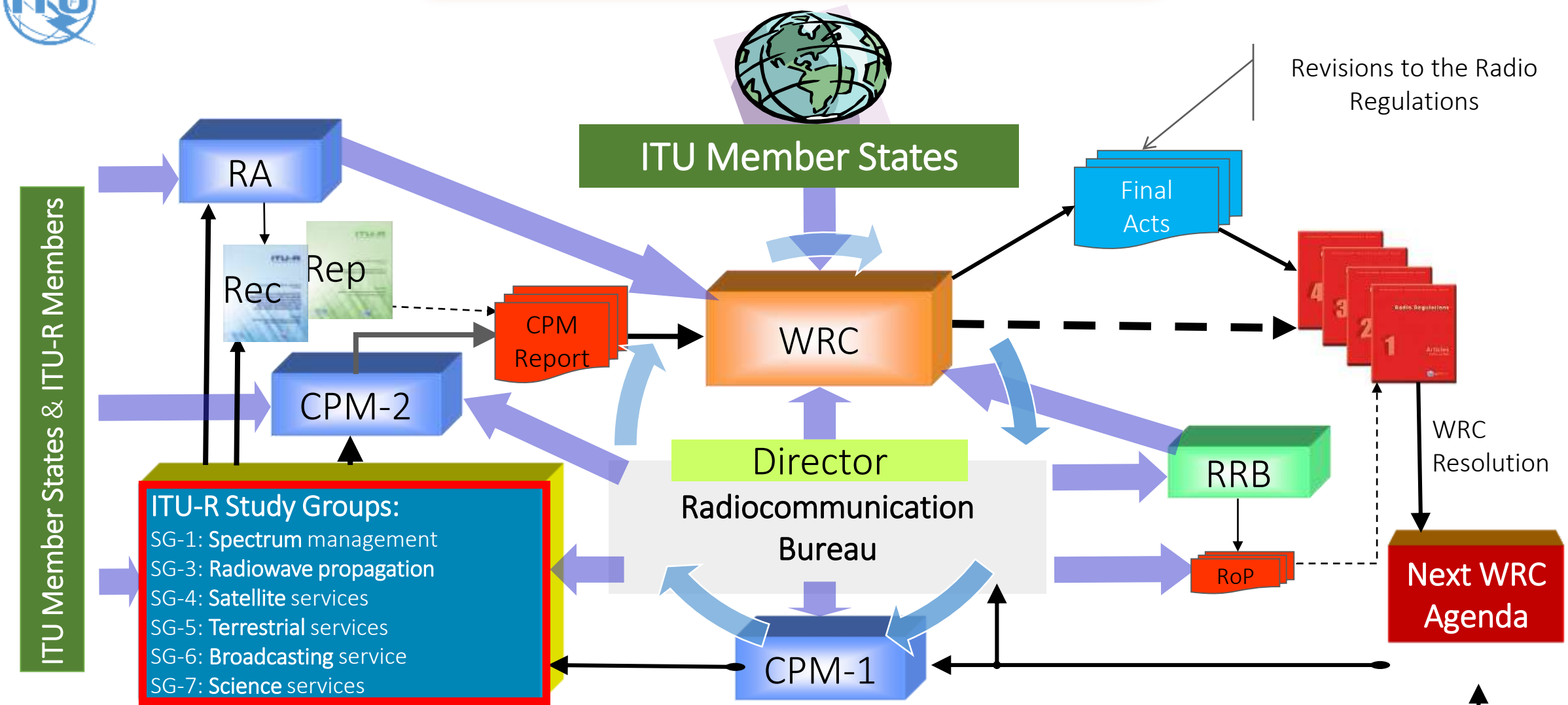
International Frequency Allocations



The shaded part represents the Tropical Zones as defined in Nos. 5.16 to 5.20 and 5.21

The WRC Cycle



RRB: Radio Regulations Board
SGs: Radiocommunication Study Groups
RA: Radiocommunication Assembly
WRC: World Radiocommunication Conference

CPM: Conference Preparatory Meeting
Rec: ITU-R Recommendation
RoP: Rules of Procedure
RR: Radio Regulations (treaty status)

ITU-D 1992 2017 CELEBRATING 25 YEARS OF ACHIEVEMENTS

Recalling WRC-15 outcomes

CELEBRATING 25 YEARS OF ACHIEVEMENTS

WRC-15 (General Information)

2-27 November 2015 in Geneva

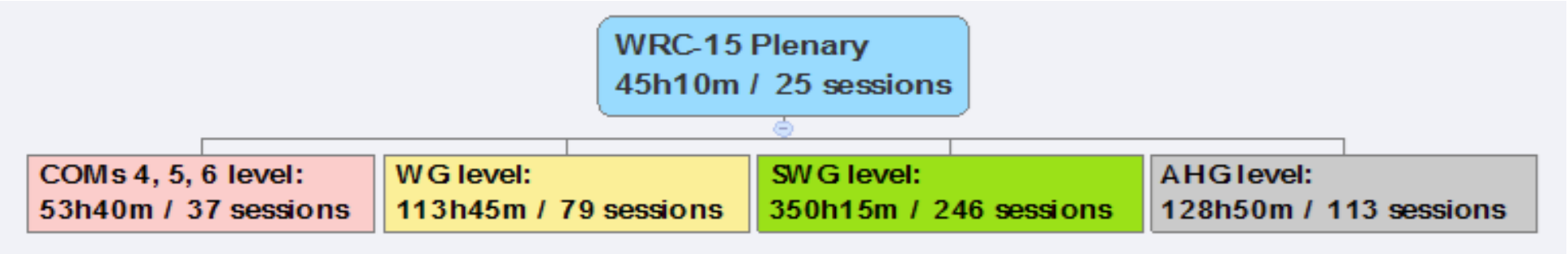
➢ 3275 participants attended WRC-15, including:

- 2780 participants from 162 Member States, and
- 495 participants representing 130 other entities, including industry, which also attended as observers

➢ 678 Documents including 2888 Member states proposals

- Two thirds (66%) of those were common proposals (either regional or multi-country).

➢ WRC-15 addressed over 40 topics related to frequency allocation and frequency sharing for the efficient use of spectrum and orbital resources.



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Outcomes of WRC-15

Public Protection and Disaster relief

(agenda Items 1.3, 9.1.1 and 9.1.7)

Background

- **REQUIREMENTS TO**
- Identify harmonized PPDR bands to benefit from economies of scale, interoperability, cross-border equipment circulation
- Review Res. 647 on emergency and disaster relief communication
- Ensure better protection of 406 – 406.1 MHz (Cospas-Sarsat)

WRC-15 Results

- **Revision of Resolution 646** -> resulted in harmonization of PPDR bands and at the same time providing flexibility for administrations
- Encouragement to use harmonized bands, especially for broadband:
  - 694 – 894 MHz – on a global basis
  - 380-470 MHz – in Region 1
  - 406.1-430 MHz, 440-470 MHz and 4 940-4 990 MHz – in Region 3
- Administrations to use **Rec. ITU-R M.2015 for national planning**
- PPDR applications **must not cause unacceptable interference to services** to which these ranges are already allocated
- **Revision of Resolution 647** on emergency and disaster relief radiocommunications. Rrelief www.itu.int/ITU-R/go/res647
  - Administrations encouraged to submit information to the database
- **Protection of 406-406.1 MHz (MSS reception of Cospas-Sarsat):**
  - Requests not to assign frequencies to FS and MS in adjacent bands
  - Administrations to take into account frequency drift of radiosondes above 405 MHz to avoid transmitting in the 406-406.1 MHz

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Outcomes of WRC-15

Amateur & Maritime Mobile Service

(agenda Items 1.4, 1.15 and 1.16)

Background

•Need for spectrum around 5 MHz in addition to existing allocations at 3.5 MHz and 7 MHz to provide flexibility of HF operations in varying propagation conditions

WRC-15 Results

- Secondary allocation to amateur service in **5 351.5-5 366.5** kHz subject to power limitations in No.5.133B:
  - maximum e.i.r.p. ≤ 15W on a global basis
  - maximum e.i.r.p. ≤ 20W and ≤ 25W in some Region 2 countries listed in No.5.133B

Implications

•contributes to flexibility and reliability of amateur communications in
• HF band -> **facilitating emergency and disaster relief operations**

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Maritime On-board communication

Background

- Problem of congestion in on-board UHF communications since only 6 frequencies around 460 MHz were available for this purpose

WRC-15 Results

- no new spectrum was allocated, but measures were adopted for more efficient usage of existing frequencies (in modified No. 5.287):
  - Introduction of new channeling arrangements of 6.25 kHz and
  - 12.5 kHz through Rec. ITU-R M. 1174-3, while retaining 25 kHz channeling for analogue systems
- Recommendation to use new digital technologies, e.g. Digital coded squelch

Implications

- provides more channels for on-board communications with the same amount of spectrum available, removes congestion

Maritime AIS *(Automatic Identification Systems)*

Background

- Development of new Automatic Identification System (AIS) applications, aimed at improving maritime communications and safety of navigation, required additional frequency resource

WRC-15 Results

- Enabling application-specific messages in AP18 chan. 2027, 2028; protection AIS by prohibiting chan. 2078, 2019, 2079, 2020 for ships
- Identification of bands for terrestrial VHF Data Exchange System (VDES): **157.200–157.325/161.800–161.925 MHz in R1, 3 and157.200–157.275 MHz /161.800 – 161.875 in some R 2 countries**
  - Secondary allocation to uplink maritime mobile-satellite service in 161.9375–161.9625 MHz/161.9875–162.0125 MHz for satellite component of VDES; downlink will be considered at WRC-19
  - VDES regional solution: identification of AP18 channels 80, 21, 81, 22, 82, 23 and 83 for digital systems in Regions 1 and 3

Outcomes of WRC-15

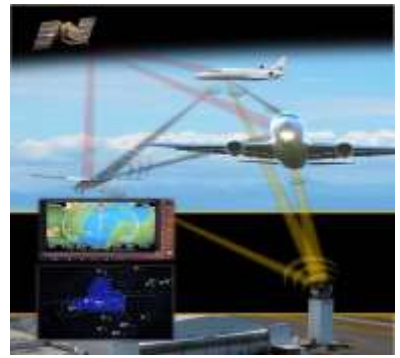
Unmanned Aircraft Systems Vehicle

Aeronautical & Automotive Applications

(agenda Item 1.5, 1.17, 1.18 and Global Flight Tracking)

Background

- Rapid UAS development, future integration in conventional air traffic
- reliable terrestrial and satellite links are critical for controlling UAS
- Need for ensuring reliability of UAS links, given interference in FSS
- Need for protection of terrestrial services because placing FSS earth station on aircraft changes interference situation
- Need for taking decision in the absence of available ICAO standards
- WRC-12 made allocation to terrestrial component in 5 GHz, but satellite component still required frequencies due to limited AMSS spectrum and lack of operational AMSS systems



WRC-15 Results

- Approval of No. 5.484B and Res. 155 [COM4/5] allowing the use of FSS assignments for UAS
- Designation of 8 bands for such usage. Total spectrum: Ku band: **970 MHz globally, 1520 MHz regionally**, Ka band: 1000 MHz globally
- FSS can be used only after development of related ICAO aeronautical standards and recommended practices (SARPs);
- Measures to avoid impact on terrestrial services and other FSS
- Requirement to UA ES to operate in existing interference environment
- Instructions to the Bureau: to identify a new class of stations for UAS, to examine Res. 155 to identify actions by administrations, not to process filings until all conditions are met, liaise with ICAO

Implications

- Paves the way for commercial utilization of UAS after 2023

Outcomes of WRC-15

Spectrum for WAIC *(Wireless Avionics Intra-Communications)*

Background

- About 30% of electrical wires are candidates for wireless substitute
- **Example A380**: wire count 100 000; length 470 km; weight 5 700 kg
- need for spectrum for WAIC to replace cables that provides safety-related data in single aircraft (e.g. from sensors to cockpit)

WRC-15 Results

- Allocation of **4 200-4 400 MHz** to AM(R)S reserved for WAIC
- Approval of Res. 424 [COM4/1]:Conditions For WAIC
  - Non-interference basis vs. aeronautical radio altimeters, obligation to comply with ICAO SARPs

Implications

- Using approved wireless technology would make new generation of aircraft more reliable, light, less fuel consuming and environmentally friendly

Global Flight Tracking

Background

- Urgent Issue. Following disappearance of MH370, PP-14 adopted Resolution 185 and established additional AI on GFT
- Need for continuous aircraft surveillance; satellite tracking could complement terrestrial tracking, e.g. radars, HF communications, etc.
- Before WRC-15 terrestrial automatic dependent surveillance-broadcast
- (ADS-B) was available that could be extended to satellite reception

WRC-15 Results

- Primary allocation of **1087.7-1092.3 MHz** for satellite reception ADS-B messages (5.328AA)
- Allocation conditions are in Resolution 425: i.e. ability operate in existing interference environment, compliance with ICAO standards

Implications

- improves aircraft tracking through utilization of an existing technology; especially important for polar, oceanic, remote areas

Outcomes of WRC-15

Automotive applications

Background

- Significant growth in the use of automotive radar systems that are critical for improving global road safety
- Increasing variety of applications e.g. adaptive cruise control, collision avoidance, blind spot detection, lane change assist, etc.
- Requirements for additional spectrum for such applications

WRC-15 Results

- Worldwide primary allocation to the radiolocation service in the band **77.5-78 GHz**
  - Allocation is limited to short-range ground-based
  - Radar, including automotive radars. Parameters are in Recommendation ITU-R M.2057-0

Implications

- **Provides harmonized and contiguous band 76 – 81 GHz** for radio location service including automotive applications. Allows radars to move from the **24 GHz band**, which had some compatibility problems

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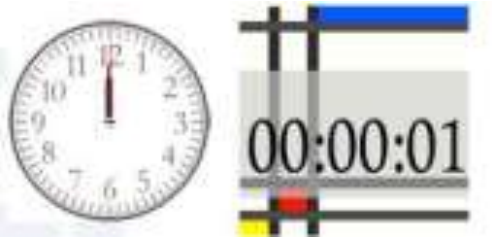
Outcomes of WRC-15



Reference Time Scale

(agenda Item 1.14)

➢ Background

The Coordinated Universal Time (UTC) adjusts atomic time and ephemeris time based on Earth rotation time by the insertion or deletion of leap seconds. Digital systems are highly dependent on keeping very precise time synchronization and thus can be disrupted when a leap second is introduced.

➢ Results of WRC-15

The current implementation of UTC to insert leap seconds will continue until WRC-23 where the issue will be discussed again.

➢ Implications

Further studies by the International Bureau of Weights and Measures (BIPM) and ITU on various aspects of the current and potential future international reference time scale

Outcomes of WRC-15

Mobile Broadband (MBB)

(agenda Item 1.1 and 1.2)

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Outcomes of WRC-15

➢ Need for More spectrum

User density	Total requirement by 2020 (MHz)	Region 1		Region 2		Region 3	
		Already identified (MHz)	Additional demand (MHz)	Already identified (MHz)	Additional demand (MHz)	Already identified (MHz)	Additional demand (MHz)
Low	1 340	981-1 181	159 – 359	951	389	885 - 1 177	163 – 455
High	1 960		779 - 979		1 009		783 - 1 075

Estimated additional spectrum requirements by 2020 ranged from 159 to 1075 MHz depending on Region and user density)

Source: CPM-15 report (Additional Spectrum Requirements)

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Outcomes of WRC-15

➢ New spectrum Identified

WRC - 15

Band (MHz)	Bandwitdh (MHz)	R1	R2	R3
470 – 608	138		some	
608 – 698	84		some	
1427 – 1452	25	any	any	any
1452 – 1492	40	some	any	any
1492 – 1518	26	any	any	any
3300 – 3400	100	some	some	some
3600 – 3700	100		some	
4800 – 4990	190		some	some
	New BW 709			

Outcomes of WRC-15

➢ Spectrum for IMT

Band (MHz)	Bandwidth (MHz)
450-470	20
470-608	138
608-698	90
698-960	262
1427-1452	25
1452-1492	40
1492-1518	26
1710-2025	315
2110-2200	90
2300-2400	100
2500-2690	190
3300-3400	100
3400-3600	200
3600-3700	100
4800-4990	190
	1,886

(Regional allocations vary and therefore totals can be different for a specific region)

Outcomes of WRC-15 *(Significance for MBB)*

- Satisfy growing IMT broadband spectrum requirements:
  - 60% increase in IMT bands after WRC-15
  - Total IMT spectrum of 1886 MHz

- Harmonization of IMT bands:
  - 39% increase in globally harmonized spectrum after WRC-15
  - 318 MHz of harmonized bands in more than 80% of countries:

- Secures future of other services through:
  - coordination procedures,
  - technical restrictions,
  - In some cases operation on a non-interference basis

WRC-15 (Follow up)

- **WRC-15 Final ACTs available at:**
  - www.itu.int/pub/R-ACT-WRC.12-2015 *(ITU CL-16/22 of 17 May 2016)*

- **Radio Regulation 2016 edition available at:**
  - http://www.itu.int/pub/R-REG-RR/en

2016 ***New!*** Publication Notice with Order Form

The Radio Regulations, edition of 2016, contains the complete texts of the Radio Regulations as adopted by the World Radiocommunication Conference (Geneva, 1995) (WRC-95), subsequently revised and approved by the World Radiocommunication Conference (Geneva, 1997) (WRC-97), the World Radiocommunication Conference (Istanbul, 2000) (WRC-2000), the World Radiocommunication Conference (Geneva, 2003) (WRC-03), the World Radiocommunication Conference (Geneva, 2007) (WRC-07), the World Radiocommunication Conference (Geneva, 2012) (WRC-12) and the World Radiocommunication Conference (Geneva, 2015) (WRC-15), including all Appendices, Resolutions, Recommendations and ITU-R Recommendations incorporated by reference. Available: end-October 2016

Available in

Other editions: 2012 Edition of 2008 Edition of 2004 Edition of 2001 Edition of 1998

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Preparatory work for WRC-19

Main Steps towards WRC-19

WRC-15: WRC-19 Agenda - Resolution 809 (WRC-15)

1st Session of Conference Preparatory Meeting: CPM19-1
30 Nov – 1 Dec. 2015; **Results @CA/226 of 23/12/2015**

C-16: WRC-19 agenda & dates in **Res. 1380** with **MOD** venue @ C-17

- **Agenda & dates approved, new venue** for consultation **of MS**

2nd Session of Conference Preparatory Meeting: CPM19-2
Planned dates at CICG in Geneva from 18 to 28 February 2019

Final meetings of regional groups
Member States' proposals to WRC-19

RA-19: **21 to 25 Oct. 2019 ;** WRC-19: **28 Oct. to 22 Nov. 2019**

CPM19-1

- Following the WRC-15 the CPM19 had its first meeting from 30 November – 1 December 2015.
  - 269 participants from 63 Member States, 1 Observer from the State of Palestine and 25 Sector Members

- The main task of the CPM was to decide on the structure of the CPM Report (for the WRC-19 conference) and the chapter rapporteurs and allocate the work to the relevant study groups.

Resolution COM 6/16 of WRC-15 contains the proposed agenda items for the WRC-19 and also references to the relevant Resolutions which are calling for the appropriate studies.

CPM19-1

➢CHAPTER 1: *Land mobile and fixed services*

- Agenda items: 1.11, 1.12, 1.14, 1.15

Rapporteur: Ms Keer ZHU (China (People's Republic of))

➢CHAPTER 2: *Broadband applications in the mobile service*

- Agenda items: 1.13, 1.16, 9.1 (issues 9.1.1, 9.1.5, 9.1.8)

Rapporteur: Mr José ARIAS (Mexico)

➢CHAPTER 3: *Satellite services*

- Agenda items: 1.4, 1.5, 1.6, 7, 9.1 (issues 9.1.2, 9.1.3, 9.1.9)

Rapporteur: Mr Nicolay VARLAMOV (Russian Federation)

➢CHAPTER 4: *Science services*

- Agenda items: 1.2, 1.3, 1.7

Rapporteur: Mr Vicent MEENS (France)

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CPM19-1

➢ CHAPTER 5: *Maritime, aeronautical and amateur services*

- Agenda items: 1.1, 1.8, 1.9, 1.10, 9.1 (issue 9.1.4)

Rapporteur: Mr Wael EL SAYED (Egypt (Arab Republic of))

➢ CHAPTER 6: *General issues*

- Agenda items: 2, 4, 9.1 (issues 9.1.6, 9.1.7), 10

Rapporteur: Mr Peter N. NGIGE (Kenya (Republic of))

Summary of AI

Agenda Item	Issues Covered	Chapter Number
1.1, 1.2, 1.3, 1.4	Mobile and Amateur	1
1.11, 1.12, 1.13, 1.14	Science	2
1.5,1.15, 1.16, 1.17, 1.18	Aeronautical, Maritime and Radiolocation Issues	3
1.6, 1.7, 1.8 , 1.9 (1.9.1 and 1.9.2), 1.10	Satellite Services, FSS	4
7, 9 (9.1, 9.2, 9.3)	Satellite Regulatory Issues	5
2 (2.1 and 2.2), 4, 9, 10	General Issues	6

Res. 809 (WRC-15): **17 specific and 6 standing Items**

ITU-R Study Groups

Study Group Number	Focus Area	Structure
SG – 1	**Spectrum Management**	▪ Working Party 1A (WP 1A) - Spectrum engineering techniques ▪ Working Party 1B (WP 1B) - Spectrum management methodologies and economic strategies ▪ Working Party 1C (WP 1C) - Spectrum monitoring
SG – 3	**Radio Wave Propagation**	▪ Working Party 3J (WP 3J) - Propagation fundamentals ▪ Working Party 3K (WP 3K) - Point-to-area propagation ▪ Working Party 3L (WP 3L) - Ionospheric propagation and radio noise ▪ Working Party 3M (WP 3M) - Point-to-point and Earth-space propagation
SG – 4	**Satellite Services**	▪ Working Party 4A (WP 4A) - Efficient orbit/spectrum utilization for FSS and BSS ▪ Working Party 4B (WP 4B) - Systems, air interfaces, performance and availability objectives for FSS, BSS and MSS, including IP-based applications and satellite news gathering ▪ Working Party 4C (WP 4C) - Efficient orbit/spectrum utilization for MSS and RDSS

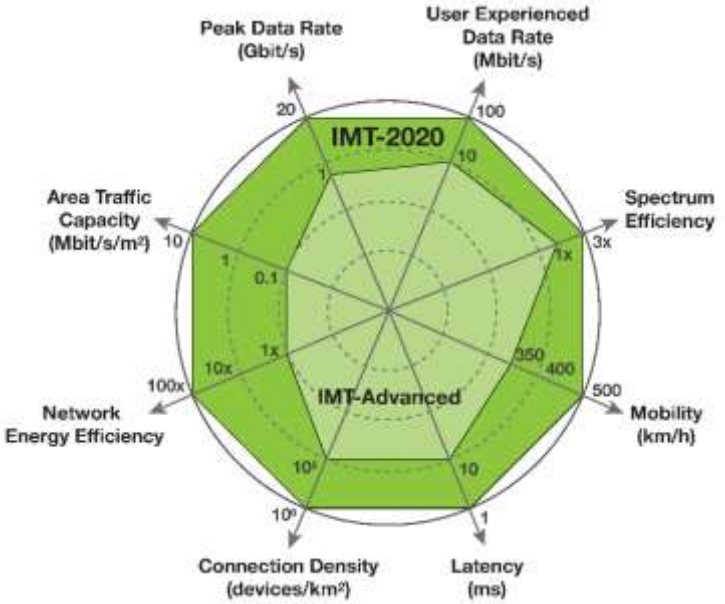
ITU-R Study Groups

Study Group Number	Focus Area	Structure
SG – 5	**Terrestrial Services**	▪ Working Party 5A (WP 5A) - Land mobile service above 30 MHz (excluding IMT); wireless access in the fixed service; amateur and amateur-satellite services ▪ Working Party 5B (WP 5B) - Maritime mobile service including Global Maritime Distress and Safety System (GMDSS); aeronautical mobile service and radiodetermination service ▪ Working Party 5C (WP 5C) - Fixed wireless systems; HF and other systems below 30 MHz in the fixed and land mobile services ▪ Working Party 5D (WP 5D) - IMT Systems ▪ Task Group 5/1 - WRC-19 Agenda item 1.13
SG – 6	**Broadcasting Services**	▪ Working Party 6A (WP 6A) - Terrestrial broadcasting delivery ▪ Working Party 6B (WP 6B) - Broadcast service assembly and access ▪ Working Party 6C (WP 6C) - Programme production and quality assessment
SG – 7	**Science Services**	▪ Working Party 7A (WP 7A) - Time signals and frequency standard emissions ▪ Working Party 7B (WP 7B) - Space radiocommunication applications ▪ Working Party 7C (WP 7C) - Remote sensing systems ▪ Working Party 7D (WP 7D) - Radio astronomy

BB applications in MS

(WRC-19 Agenda item 1.13 and 1.16)

- The following bands, which are already allocated to mobile, will be studied with a view to an IMT-2020 identification:
  - 24.25 – 27.5 GHz
  - 37 – 40.5 GHz
  - 42.5 – 43.5 GHz
  - 45.5 – 47 GHz
  - 47.2 – 50.2 GHz
  - 50.4 – 52.6 GHz
  - 66 – 76 GHz
  - 81 – 86 GHz



- The following bands will also be studied, although they do not currently have global mobile allocations: Res. 238 (WRC-15)
  - 31.8 – 33.4 GHz
  - 40.5 – 42.5 GHz
  - 47 - 47.2 GHz

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Overlapping Bands in WRC-19 Agenda Items

1.6 – NGSO FSS Res. 159 (WRC-15)	1.13 – IMT Res. 238 (WRC-15)	1.14 – HAPS Res. 160 (WRC-15)	9.1 (9.1.9) – FSS Res. 162 (WRC-15)
	24.25 - 27.5	24.25 - 27.5 (Reg. 2)	
37.5 - 39.5 (s-E*)	37 - 40.5	38 - 39.5 (globally)	
39.5 - 42.5 (s-E*)	40.5 - 42.5		
47.2 - 50.2 (E-s*)	47.2 - 50.2		
50.4 - 51.4 (E-s*)	50.4 - 52.6		51.4 - 52.4 (E-s*)

- **E-s: Earth-to-space; s-E: space-to-Earth.**
- **All bands in GHz**

Studies to **address mutual compatibility & sharing feasibility** among the **services/applications** for which **allocation/identification is envisaged** under the corresponding Res. relating to the AI in the overlapping bands

Future Spectrum need estimation for IMT

(24.25 GHz - 86 GHz)

	Examples	Associated conditions for different examples (For details, please see the corresponding sections in the Annex A)	Spectrum needs in total (GHz)	Spectrum needs (GHz) per range
Application-based approach ITU-R M.1651	1	Overcrowded, Dense urban and Urban areas	**18.7**	➢ 3.3 (24.25-33.4 GHz range) ➢ 6.1 (37-52.6 GHz range) ➢ 9.3 (66-86 GHz range)
		Dense urban and Urban areas	**11.4**	➢ 2.0 (24.25-33.4 GHz range) ➢ 3.7 (37-52.6 GHz range) ➢ 5.7 (66-86 GHz range)
	2	Highly crowded area	**3.7**	➢ 0.67 (24.25-33.4 GHz range) ➢ 1.2 (37-52.6 GHz range) ➢ 1.9 (66-86 GHz range)
		Crowded area	**1.8**	➢ 0.33 (24.25-33.4 GHz range) ➢ 0.61 (37-52.6 GHz range) ➢ 0.93 (66-86 GHz range)

Source: Chairman's report TG 5/1 Annex 2: *Working document towards Draft CPM text for WRC-19 AGenda Item 1.13*

Future Spectrum need estimation for IMT

(24.25 GHz - 86 GHz)

	Examples	Associated conditions for different examples (For details, please see the corresponding sections in the Annex A)	Spectrum needs in total (GHz)	Spectrum needs (GHz) per range
Technical performance -based approach (Type 1) *Calculated on single technical performance requirement, i.e. user experienced data rate.*	1	User experienced data rate of 1 Gbit/s with N simultaneously served users/devices at the cell-edge, e.g., Indoor	➢ 3.33 (N=1), ➢ 6.67 (N=2), ➢ 13.33 (N=4)	Not available
		User experienced data rate of 100 Mbits/s with N simultaneously served users/devices at the cell-edge, for wide area coverage	➢ 0.67 (N=1), ➢ 1.32 (N=2), ➢ 2.64 (N=4)	Not available
	2	eMBB Dense Urban	➢ 0.83-4.17	Not available
		eMBB Indoor Hotspot	➢ 3-15	Not available
	3	With a file transfer of 10 Mbits by a single user at cell-edge in 1 msec	➢ 33.33 GHz (one direction)	Not available
		With a file transfer of 1 Mbit by a single user at cell-edge in 1 msec	➢ 3.33 GHz (one direction)	
		With a file transfer of 0.1 Mbits by a single user at cell-edge in 1 msec	➢ 333 MHz (one direction)	

Source: Chairman's report TG 5/1 Annex 2: *Working document towards Draft CPM text for WRC-19 Agenda Item 1.13*

Future Spectrum need estimation for IMT

(24.25 GHz - 86 GHz)

	Examples	Associated conditions for different examples (For details, please see the corresponding sections in the Annex A)	Spectrum needs in total (GHz)	Spectrum needs (GHz) per range
Technical performance-based approach (Type 2) *Calculated taking into account different technical performance requirements, i.e. user experienced data rate, peak data rate and area traffic capacity*	–	Dense urban micro	**14.8-19.7**	5.8-7.7 (24.25-43.5 GHz range)
		Indoor hotspot		9-12 (24.25-43.5GHz and 45.5-86 GHz range)
Information from some countries based on their national considerations	–	–	**7-16**	2-6 (24.25-43.5 GHz range) 5-10 (43.5-86 GHz range)

Source: Chairman's report TG 5/1 Annex 2: *Working document towards Draft CPM text for WRC-19 Agenda Item 1.13*

Note: The spectrum needs estimates of the different approaches and examples should be considered separately.

Future Spectrum need estimation for IMT

(24.25 GHz - 86 GHz)

Deployment scenarios	Indoor hotspot	Dense urban		Urban macro
		Micro	Macro	
Frequency range	24.25-86 GHz	24.25-43.5 GHz	<6 GHz	<6 GHz

Deployment scenario	Micro	Indoor hotspot
Total spectrum needs for 24.25-86 GHz	14.8-19.7 GHz*	
Spectrum needs for 24.25-43.5 GHz	5.8-7.7 GHz	9-12 GHz
Spectrum needs for 45.5-86 GHz	–**	

* Considering the coexistence between multiple network operators (e.g. the guard band(s) may be required in the case of multiple network operators scenarios), the total spectrum needs are expected to be increased.

** The division in this table regarding frequency ranges and deployment scenarios is just an indicative example on how spectrum needs could be distributed for different spectrum sub-ranges within 24.25-86 GHz and different deployment scenarios. This table should not be understood nor used to exclude any possible IMT-2020 deployment options in the range 45.5-86 GHz.

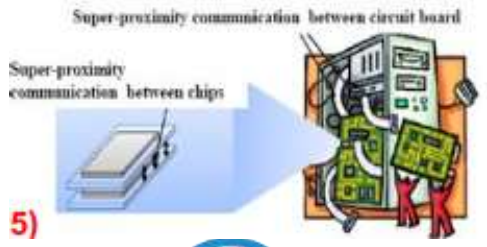
Source: WP 5D Liaison statement to Task Group 5/1

LMS and FS systems and applications

(WRC-19 Agenda item 1.14 and 1.15)

- Res. 160 (WRC-15) Studies for considering appropriate regulatory actions for HAPS, within existing FS allocation i.e
  - at 47.2-47.5, 47.9-48.2 & 31.0-31.3**/27.9-28.2GHz (outside Reg. 2, +5 ADMs @6.5/6.5MHz)
  - or study new bands: 38-39.5 GHz & 21.4-22 &24.25-27.5 GHz

- Res. 767 (WRC-15) Studies towards an identification for use by Administrations for LMS and FS applications operating in the frequency range 275-450 GHz



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New transport Systems in MS

(WRC-19 Agenda item 1.11 and 1.12)

- Res. 236 (WRC-15) Studies to facilitate global or regional harmonized bands to support railways RF systems between train & trackside within existing MS allocations

- Res. 237 (WRC-15) Global or regionally harmonized bands, to the maximum extent possible, for implementation of evolving ITS within existing MS allocations

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Maritime, Aeronautical, Amateur and Science

- Maritime (WRC-19 Agenda item 1.8, 1.9.1 and 1.9.2)
  - Res. 359 (WRC-15) *Regulatory Issues to support GMDSS*
  - Res. 362 (WRC-15) *Regulatory actions within the band 156-162.05 MHz for autonomous maritime radio devices to protect the GMDSS and AIS*
  - Res. 360 (WRC-15) *Studies to consider RR MODs, including new MMSS (E-s & s-E)allocations, preferably within 156.0125-157.4375 MHz & 160.6125-162.0375 MHz of RR App. 18, to enable a new VDES (VHF data exchange system) satellite component*

- Aeronautical and Amateur (WRC-19 Agenda item 1.10 and 1.1)
- Res. 426 (WRC-15) *spectrum needs & regulatory provisions for introduction and use of the GADSS (Global Aeronautical Distress and Safety System)*

- Science (WRC-19 Agenda item 1.2, 1.3 and 1.7)
  - *Res. 765 (WRC-15) MetSat and EESS, Res. 766 (WRC-15) for Metsat (s-E) and EESS (s-E) for DCS, Res. 659 (WRC-15) on TT&C in the SOS for non-GSO satellite*

Agenda for WRC-19 (Agenda item 10 of WRC-15)

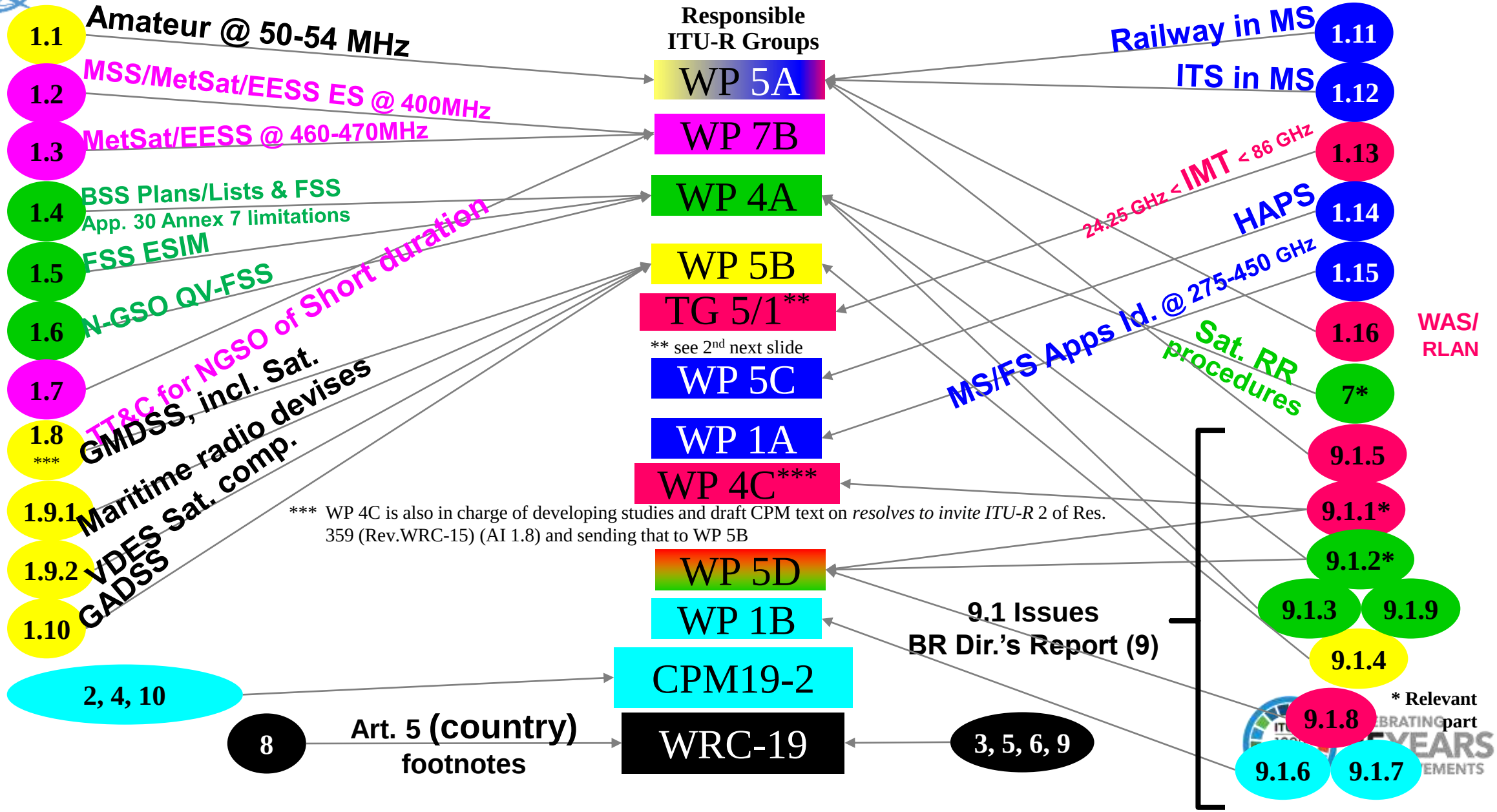
- Res. 958 (WRC-15): URGENT STUDIES to be reported under WRC-19 agenda item 9.1 :

  - (9.1.6) Wireless Power Transmission (WPT) for electric vehicles
    - Study suitable harmonized bands to minimize impact on RF services
  - (9.1.7) Managing unauthorized operations of Earth Station terminals
    - study need for possible additional measures and possible methods that will assist administrations
  - (9.1.8) Narrowband & BB machine-type communication infrastructures
    - study related technical and operational aspects of radio networks and systems (incl. spectrum needs & possible harmonized use of spectrum)

Other studies in WRC-15 Res. to be reported in WRC-19

- OTHER STUDIES to be reported under WRC-19 agenda item 9.1 :
  - (9.1.1) Res. 212 – Terrestrial and Satellite components (Rev.WRC-15) of **IMT**, co- existence & compatibility @ 1 885-2025 & 2110-2200 MHz
  - (9.1.2) Res. 761 – **IMT** and BSS sound @ 1452-1492 MHz (WRC-15) in **R1&3**
  - (9.1.3) Res. 157 – N-GSO Sat. in "C-Band" allocated to (WRC-15) the FSS
  - (9.1.4) Res. 763 – Stations on board sub-orbital vehicles (WRC-15)
  - (9.1.5) Res. 764 – Incorporation by reference of (WRC-15) Rec. ITU-R M.1638-1 & ITU-R M.1849-1
  - (9.1.9) Res. 162 – FSS needs @ 51.4-52.4 GHz(WRC-15)

WRC-19 agenda items & Resp. Groups



WRC-23 Preliminary Agenda

(WRC-15 Agenda item 10)

- Res. 810 (WRC-15) 5 preliminary agenda items
  - **Res. 361 – AI2.1** - *Spectrum for GMDSS modernization & (WRC-15) implementation of e-navigation*
    - *Responsible ITU-R Group* ***WP-5B***
  - **Res. 656 – AI2.2** - *Possible new allocations for EESS (active) for (WRC-15) spaceborne radar sounders @ 45 MHz*
    - *Responsible ITU-R Group* ***WP-7C***
  - **Res. 657 – AI2.3** - *Spectrum needs & designation of radio (WRC-15) services for space weather sensors*
    - *Responsible ITU-R Group* ***WP-7C***
  - **Res. 161 – AI2.4** - *Possible new alloc. for FSS @ 37.5-39.5 GHz (WRC-15)*
    - *Responsible ITU-R Group* ***WP-4A***
  - **Res. 235 – AI2.5** - *Spectrum use and needs of existing services (WRC-15) @ 470-960 MHz in Region 1 and possible regulatory actions @ 470-694 MHz in Region 1*
    - ***None***

Going Forward towards WRC-19

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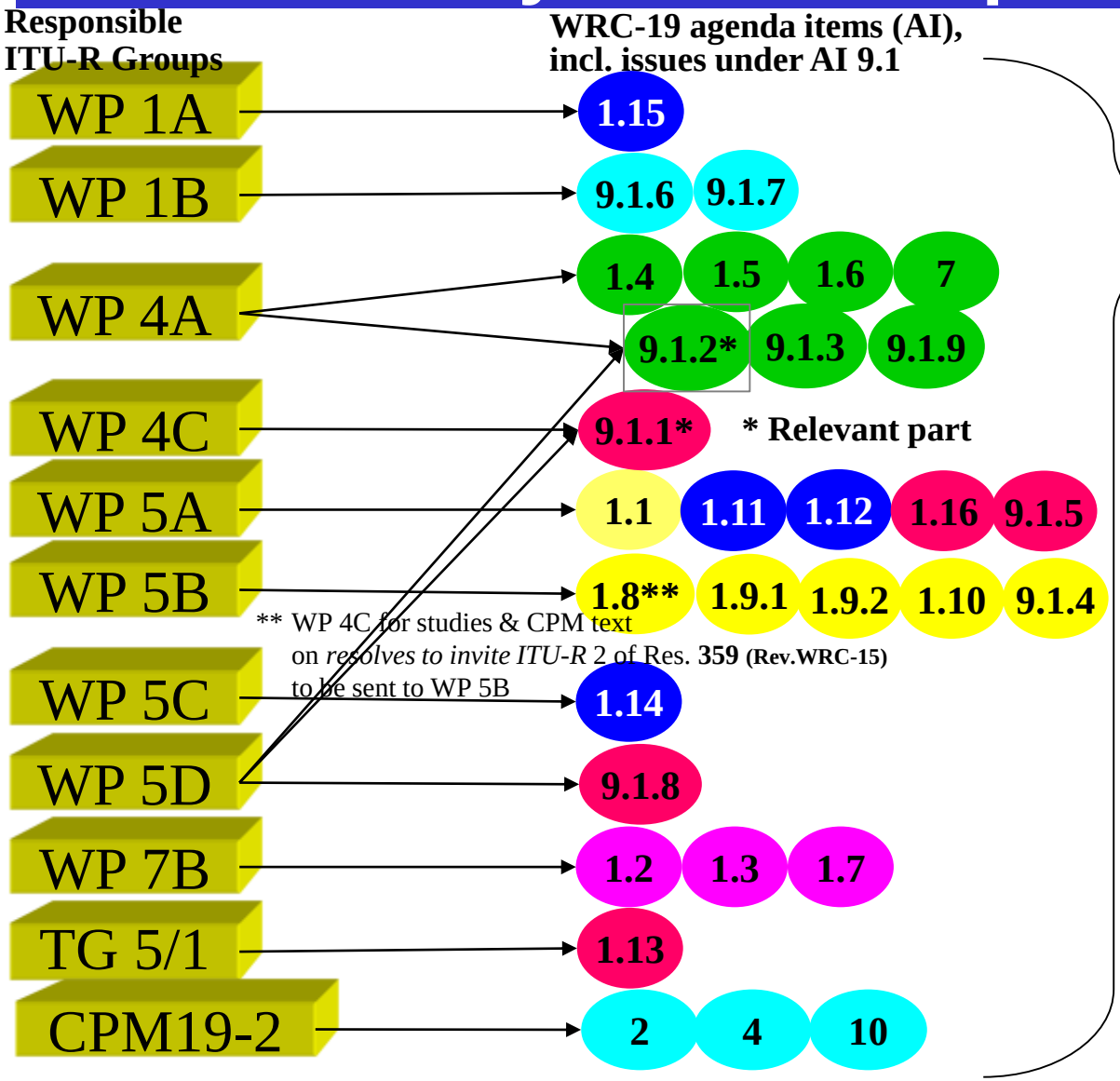
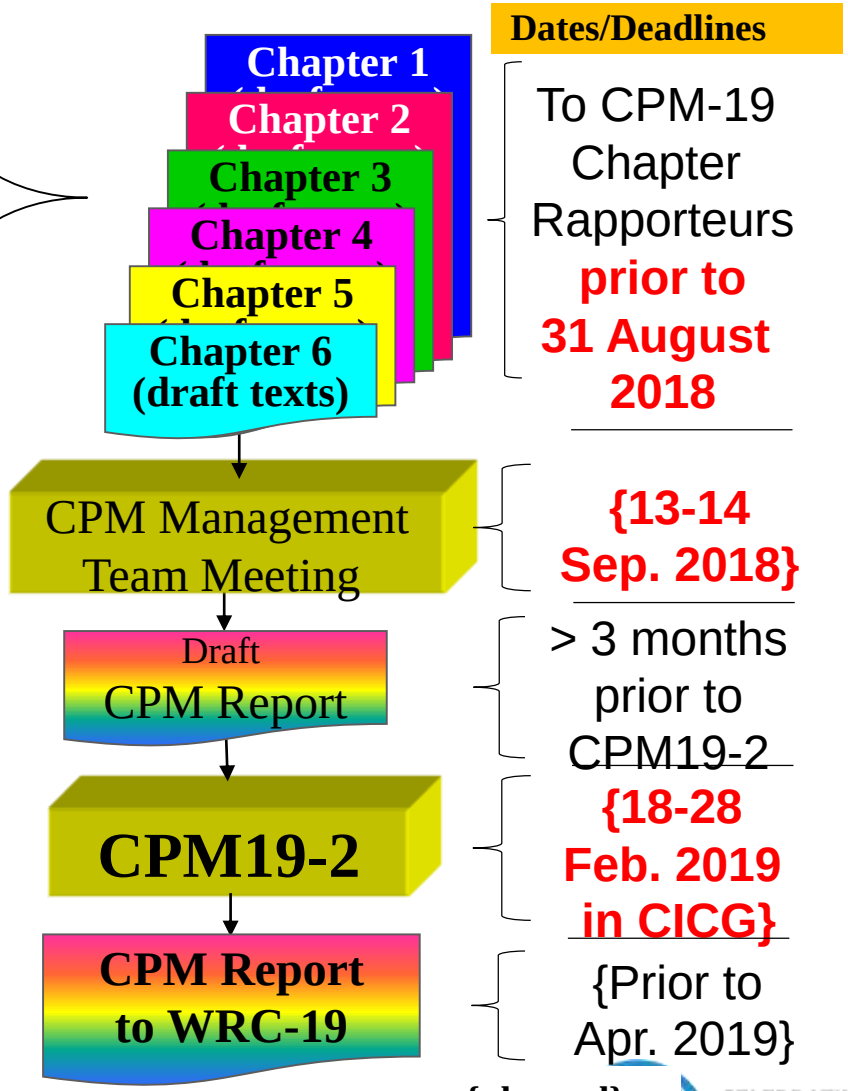
Summary of CPM Report Preparation





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ITU inter-regional Workshops for WRC-19

1st Workshop 21-22 Nov. 2017

- **To be scheduled halfway through the preparatory cycle**
  - *Presentation and review of the on-going preparatory studies of the ITU-R responsible groups for CPM-19*
  - *Presentation of the organization, preliminary views, draft priorities and positions of the regional groups*

2nd Workshop [20 – 22 Nov 2018]

- **To be scheduled few months prior to CPM19-2**
  - *Presentation of the Draft CPM Report to WRC-19 (explanation of the draft Methods to satisfy the (WRC-19 agenda items)*
  - *Presentation and review of the regional groups' draft views, positions and common proposals*

3rd Workshop [Q3 2019]**

- **To be scheduled few months prior to WRC-19**
  - *Presentation of the CPM & Dir. Reports to WRC-19*
  - *Presentation and review of the regional groups' draft views, positions and common proposals*

**Updated information on meeting dates to be provided later on at: www.itu.int/en/events/Pages/Calendar-Events.aspx?sector=ITU-R

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I Thank U

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