ITU TRAINING ON SPECTRUM MANAGEMENT FOR TERRESTRIAL SERVICES
VICTORIA, REPUBLIC OF SEYCHELLES, 5 - 9OCTOBER, 2015

World Radiocommunication Conference 2015 (WRC-15)

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Radiocommunication Bureau

WRC: what is it ?

- WRC is the highest level body who make decisions in international spectrum management
- WRCs satisfy requirements in frequencies, set up framework for new technologies, protect existing radio services
- WRCs revise Radio Regulations: allocate frequency bands, change regulatory and administrative procedures, modifies frequency plans
- WRCs take place every 3- 4 years (2003, 2007, 2012, 2015, 2019)
- Participants: regulators, science and industry, operators, international organizations

Example: WRC-12

- Took place in Geneva from 23 January to 17 February, 2012
- 33 agenda items addressed
- Attended by more than 2800 delegates from 161 countries and 100 companies
- Results: Final Acts -> Radio Regulations, edition 2012

WRC preparations and documents

Each WRC-12 develops agenda for the next Conference

ITU-R Study Groups, Special Committee on regulatory and procedural issues

1st Conference Preparatory Meeting (CPM)

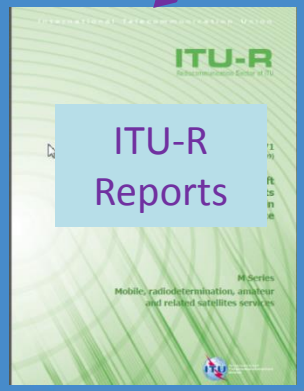
Draft Report of Conference Preparatory Meeting (CPM)

2nd Conference Preparatory Meeting

Contributions of administrations

Отчет собрания по подготовке к конференции

WRC



WRC-15 Agenda

No	Agenda item	Group	No	Agenda item	Group
1.1	Additional allocations to IMT	JTG 4-5-6-7	1.10	MSS in 22-26 GHz for IMT	4C
1.2	IMT in 694–790 MHz in Region 1	JTG 4-5-6-7	1.11	EESS in 7–8 GHz	7B
1.3	PPDR, revisión of Res. 648	5A	1.12	EESS in 8-10 GHz	7C
1.4	Amateur Service in 5 MHz	5A	1.13	Revision of 5 km limit in SRS	7B
1.5	FSS for unmanned aircraft	5B	1.14	Coordinated Universal Time	7A
1.6	Allocations to FSS in 10–17 GHz	4A	1.15	On-board maritime communications	5B
1.7	Use of 5 091-5 150 MHz by FSS	4A	1.16	Automatic identification systems (AIS) in MMS	5B
1.8	Earth stations on vessels	4A	1.17	Wireless avionics intra communications (WAIC)	5B
1.9	Additional allocations to FSS and MMSS in 7/8 GHz	4A, 4C	1.18	Automotive radars in 78 GHz	5B

+ Additional Agenda Item: Global Flight Tracking

Item 9.1 – ITU-R activities since WRC-12

- 9.1.1 MSS (Cospas-Sarsat) in 406-406.1 MHz
- 9.1.2 Coordination arc Reduction, technical criteria (9.41&9.7)
- 9.1.3 Spectrum/orbit resource for international telecommunications in developing countries
- 9.1.4 Update and re-organization of the RR
- 9.1.5 FSS earth station operation in 3.4-4.2 GHz, to support aeronautical Communications in Region 1
- 9.1.6 Definition of Fixed Service, Fixed and Mobile station
- 9.1.7 Spectrum management guidelines for PPDR
- 9.1.8 Regulatory aspects of Nano- and Pico satellites

Land mobile service

Spectrum resource mobile broadband: agenda items 1.1 and 1.2

Agenda item 1.1

- AI 1.1 - Additional frequency allocations on a primary basis to mobile terrestrial broadband services (IMT)
- Steps of preparations:
  - Estimate future traffic requirements for IMT and identify the amount of spectrum needed
  - search for appropriate frequency bands (<1 GHz> 1 GHz)
  - analyze possibilities and conditions of sharing with existing services in these bands
  - making decision at WRC-15

Estimated additional spectrum requirements for IMT by 2020

User density settings	Total spectrum requirements (MHz)	Region 1		Region 2		Region 3	
		Already identified (MHz)*	Additional spectrum requirements (MHz)*	Already identified (MHz)	Additional spectrum requirements (MHz)	Already identified (MHz)*	Additional spectrum requirements (MHz)*
Low	1 340	981-1 181	**159-359**	951	**389**	885-1 177	**163-455**
High	1 960	981-1 181	**779-979**	951	**1 009**	885-1 177	**783-1 075**

Agenda item 1.1 (contin.)

Candidate bands and other services operated in these bands

Frequency band	Other services
470-694/698 MHz	BS (televisión)
1 350-1 400 MHz	Radiolocalización (FS and MS en Reg.1) RAS (1 400-1 427)
1 427-1 452 MHz	Telemedida móvil aeronáutica (AMT), FS
1 452-1 492 MHz	FS, BS, RDS, AMT, BSS
1 492-1 518 MHz	FS, AMT
1 518-1 525 MHz	FS, AMT, MSS
1 695-1 710 MHz	Met.Aids, Met.Sat, FS
2 700–2 900 MHz	ARNS, Met.Radar
3 300–3 400 MHz	Radiolocalización (FS and MS in Reg. 1 and 3)
3 400-4 200 MHz	FS, FSS
4 400-4 990 MHz	FS, AMS
5 350-5 470 MHz	EESS(active), Radiolocalización, ARNS, SRS
5 725-5 850 MHz	FSS, Radiolocalización
5 925-6 425 MHz	FS, FSS

Results of sharing studies are summarized in Section 1/1.1/3.2 of the CPM Report

Agenda item 1.2 - overview

- **AI 1.2 – Mobile service in 694 – 790 MHz in Region 1**

After WRC-12

Region 1
694–790 BROADCASTING 5.149 5.291A 5.294 5.296 5.300 5.304 5.306 5.311A 5.312 5.312A

Band 694 – 790 MHz allocated to mobile service, entry into force postponed until WRC-15 (Res. 232)

3.5 year studies

After WRC-15

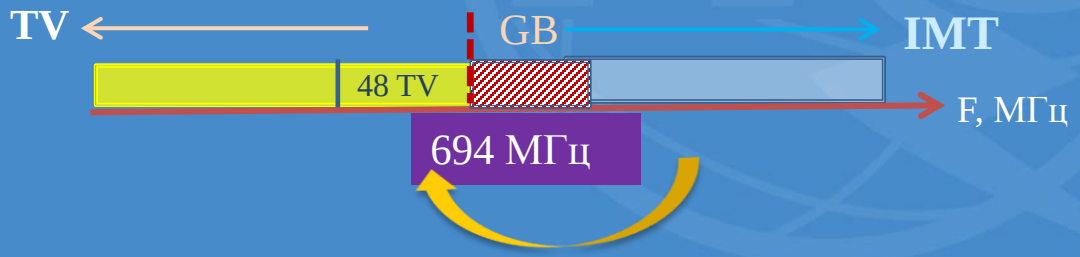
Region 1
470–790 MOBILE, except aeronautical mobile BROADCASTING 5.149 5.291A 5.294 5.296 5.300 5.304 5.306 5.311A 5.312 5.312A

Join Task Group JTG 4-5-6-7

694–790 MHz allocated to mobile and broadcasting co-primary from 28.10.2015

Agenda item 1.2 - issues

- Issue A – determination of the lower band edge (694 MHz)
- Issue B - compatibility of MS and broadcasting service (TV)
- Issue C - compatibility of MS and aeronautical radionavigation
- Issue D – accommodation of applications ancillary to broadcasting (e.g. radio microphones in 470 – 790 MHz)
- Proposals for Issue B:
  - Defining guard band between IMT and TV (otherwise filters on TV, higher requirements to mobile devices - costly)



  - Imposing power limits IMT to protect broadcasting
- Proposals for Issue B: coordination of IMT with ARNS

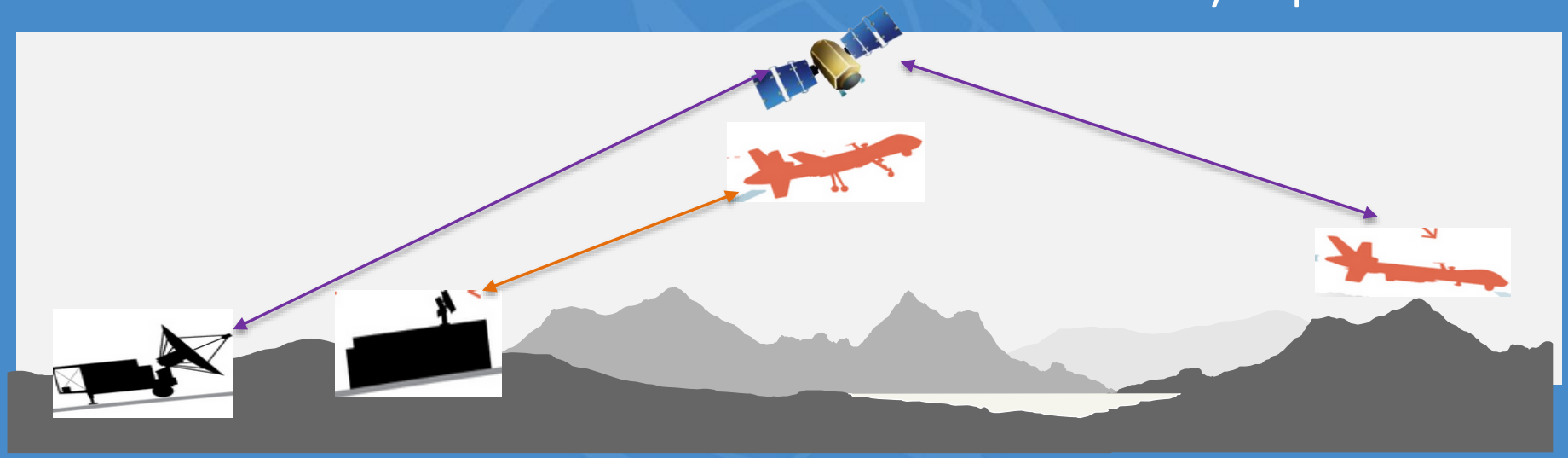
Aeronautical services

Spectrum resource for aeronautical services: agenda items 1.5 and 1.17, GFT

Agenda item 1.5

AI 1.5 – Use of fixed-satellite service for unmanned aircraft (UAS)

- Rapid development of UAS (PPDR, agriculture, surveillance…)
- Expansion of UAS and future integration in conventional air traffic
- UAS relies on radio to control UA. Reliable links are very important



- UA is controlled by terrestrial link in line of sight, and switches to satellite when not visible from ground -> need for terrestrial and space spectrum

Agenda item 1.5 (cont.)

- ***ITU activities***:
  - 2007 – 2011 - spectrum requirements (34 MHz for terrestrial, 56 MHz for satellite links), selection of suitable frequency bands
  - WRC-12 - allocation to terrestrial component in 5 GHz. Shortage of satellite spectrum and aeronautical mobile satellite systems
  - WRC-15 - consider possibility of using existing fixed-satellite service allocations for UAS
- ***Challenges***:
  - FSS channels often experience interference: reliability of UAS links
  - Placing FSS earth station on aircraft changes interference situation for other services: protection of terrestrial services
- ***Methods***: A - allow FSS for UAS and specify conditions of such use;
  B – not to allow FSS for UAS

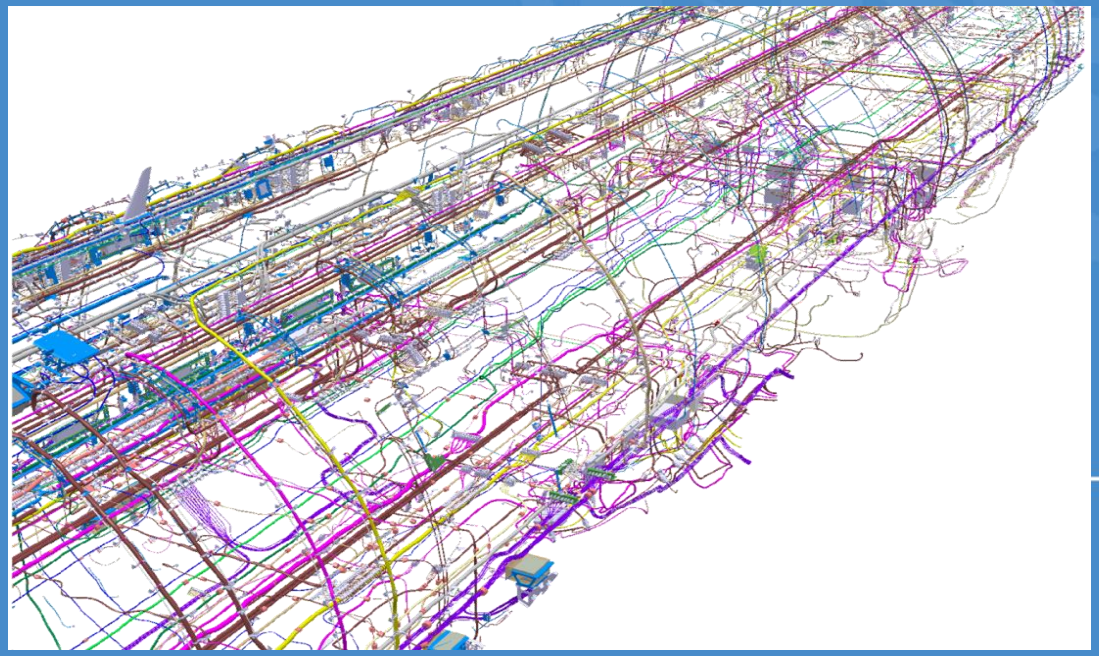
Agenda item 1.17 - WAIC

AI 1.5 – spectrum for wireless avionics intra-communications

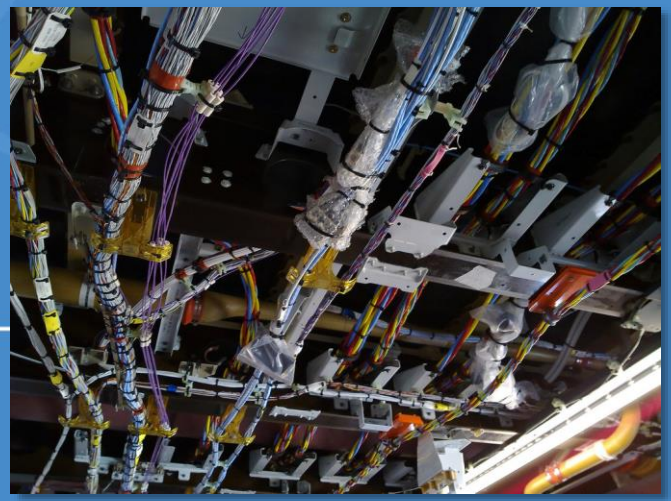
- **Objective**: to partly replace aircraft cables by radio

- Example of electrical wiring in A380-800: Total wire count: 100 000; total wire length 470 km; total weight of wires: 5 700 kg

- About 30% of electrical wires are potential candidates for a wireless substitute -> reduction of weight -> economy of fuel



Typical wiring installation in A380 crown area



Agenda item 1.17 (cont.)

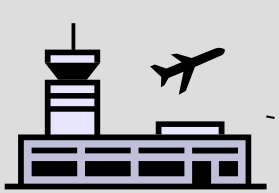
Examples of Aircraft Wireless Applications – traditional vs. WAIC

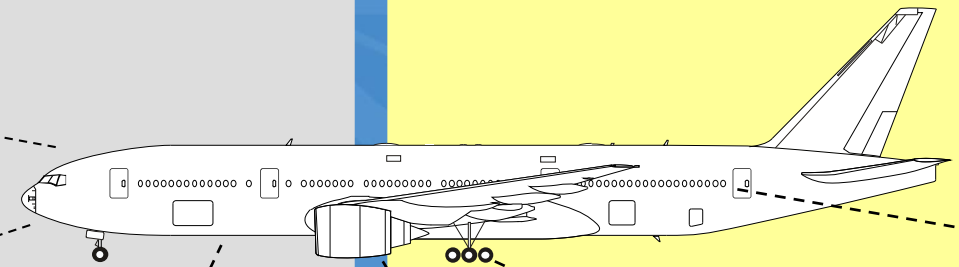
Current Aircraft Communications:

- Safety-related communications
  - HF/VHF/Satellite communications
- Non-safety related communications
  - Passenger connectivity

WAIC Systems:

- Safety-related applications, e.g.
  - Sensors/Actuators
  - Additional wireless redundancy for wired communications



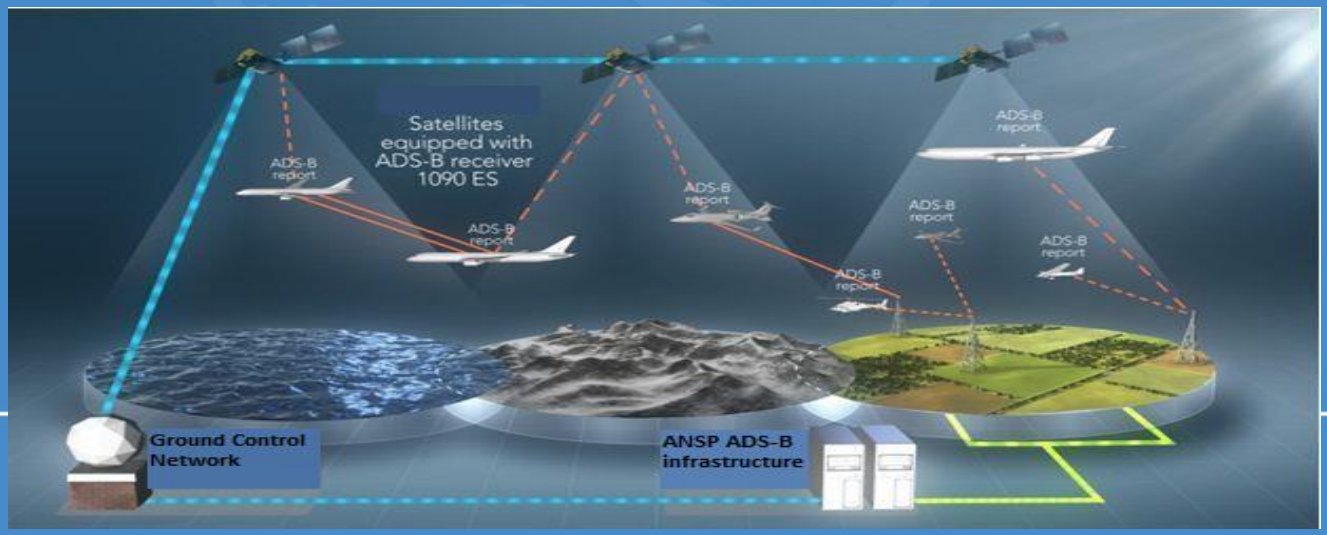


Agenda item 1.17 – proposed solutions

- Results of studies:
  - Requirements of spectrum: 145 MHz
  - Suitable candidate bands: 2 700-2 900 MHz, 4 200-4 400 MHz et 5 350-5 460 MHz
  - Bands should be harmonized worldwide
  - Only the frequency band 4 200-4 400 MHz shows that sharing is possible.
- Proposed method:
  - A new allocation to the AM(R)S reserved exclusively for WAIC systems in the frequency band 4 200-4 400 MHz with an accompanying Resolution

Global Flight Tracking (GFT)

- ITU Plenipotentiary Conference, Busan, 2014, adopted Resolution 185 "Global flight tracking for civil aviation"
- Res.185 instructs WRC-15 to include the item on its agenda
- GFT involves terrestrial and space systems, e.g. radars, HF, ADS-C
- One of such systems is ADS-B. It sends aircraft position to ground stations twice per second; limited to terrestrial usage.
- WRC-15 may allocate spectrum around 1090 MHz for satellite reception of ADS-B signals -> GFT in polar, oceanic and remote areas



Examples of space services agenda items

- 1.6.1- allocations to fixed-satellite service in up and downlinks of 250 MHz between 10 GHz and 17 GHz in Region 1
  - **Issue** 1.6.1 – amount of FSS spectrum in Region 1 < than in Regions 2/3 by 250 and 300 MHz. **Task** – to balance allocations
- 1.6.2 - allocations to fixed-satellite service (Earth-to-space) of 250 MHz in Region 2 and 300 MHz in Region 3 in 13-17 GHz
  - **Issue** 1.6.2 – amount of FSS spectrum in Regions 2 and 3 in uplink is greater by 200 and 300 MHz than in downlink. **Task**: to balance uplink and downlink spectrum

UPLINK	Disbalance 250 MHz		13750	14000	14000		14500
DOWNLINK	10950	11200	11450	11700	11700		12200

Examples of space services agenda items

- AI 1.8 - to review the provisions relating to earth stations located on board vessels (ESVs)
  - **Issue**: ESVs can operate in 6 and 14 GHz FSS bands subject to strict regulatory and technical limitations. **Task**: to revise the limitations to reflect the current ESV technologies and characteristics

- AI 1.10 - possible additional allocations for mobile-satellite service including satellite component for IMT in 22- 26 GHz
  - **Issue**: additional spectrum needs for MSS are between 240 and 335 MHz in each direction. **Task**: to try to satisfy these spectrum requirements while protecting existing services

Proposals for agenda of WRC-19

- AI 10 - to recommend items for the agenda for the next WRC, and preliminary agenda for the subsequent conference …
- Examples of proposals for inclusion in agenda of WRC-19:
  - frequency bands for IMT above 6 GHz;
  - Spectrum for RLAN in the 5350-5470 MHz band
  - spectrum for Intelligent Transport Systems (ITS) applications
  - regulations for Global Aeronautical Distress Safety System
  - radiocommunications between train and tracksides
  - spectrum for broadband High Altitude Platform Stations (HAPS)
  - allocation for FSS in 32.3 - 33 GHz, 37.5-39.5 GHz
  - Non-geostationary Satellites (NGSOs) in the V band
  - Allocations to EESS in 40 – 50 GHz
  - regulations for nano- and pico satellites

WRC-15 WEB page

www.itu.int/go/wrc-15

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Newsroom

The World Radiocommunication Conference 2015 (WRC-15) will be held in Geneva, Switzerland, from 2 to 27 November 2015, immediately after the Radiocommunication Assembly 2015 (RA-15) held from 26 to 30 October 2015

About the World Radiocommunication Conference

World radiocommunication conferences (WRC) are held every three to four years. It is the job of WRC to review, and, if necessary, revise the Radio Regulations, the international treaty governing the use of the radio-frequency spectrum and the geostationary-satellite and non-geostationary-satellite orbits. More >

WRC-15 documents

- Contributions (C)
- Proposal Management System
- Other Documents and WRC-15 Sync Application

Preparatory process

- Conference Preparatory Meeting (CPM)
- ITU Inter-regional Workshops on WRC-15 Preparation - 3rd Workshop (1-3 September 2015)
- Regional preparation for WRC-15
- Informal Group (Chairman: Mr. A. Nalbandian, albert.nalbandian@ties.itu.int)

Invitation and Credentials | Contacts

Member States:

- Circular Letter No. 15/02 *(Invitation letter to WRC-15 for Member States)* (2015-01-19 & 2015-06-17)
  Circular Letter No. 15/35 *(Invitation letter - Informal Meeting of Heads of Delegation)* (2015-09-07)

State of Palestine:

- DM-15/1003 (2015-01-19)

Observers:

- DM-15/1000 (2015-01-19)

BR Administrative Circular (CA):

- CA/219 (2015-02-17)

Credentials:

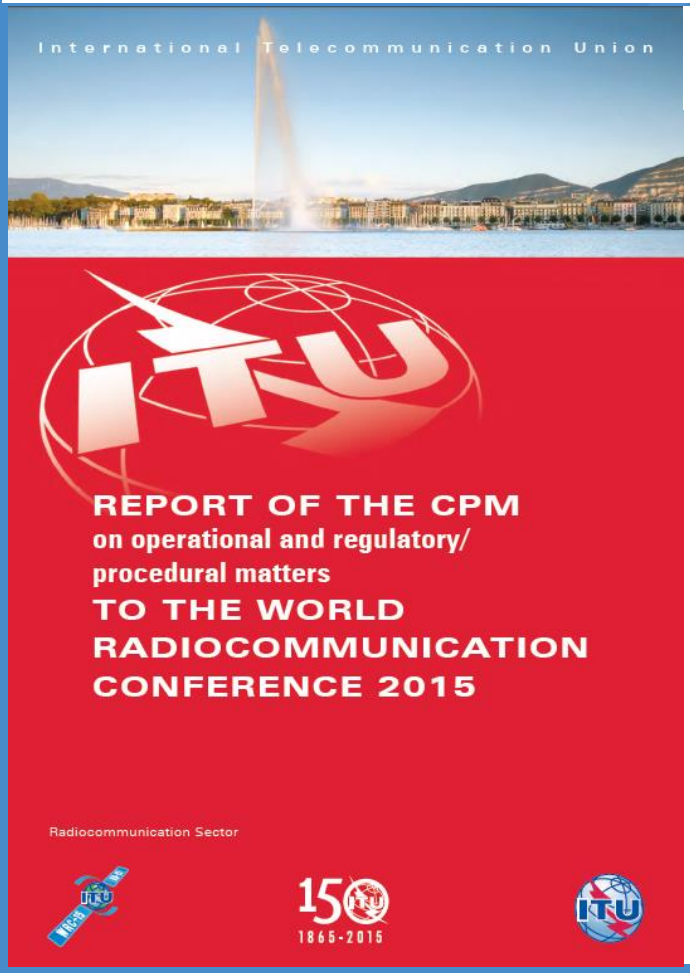
- Circular Letter No. 15/018 (2015-04-14)
  Circular Letter No. 15/037 (2015-08-31)

Model for depositing credentials

Registration through the online registration system **does not** exempt Member States from the need to submit an original credentials document for WRC-15.

CPM Report to WRC-15

- **Contains methods to satisfy WRC-15 Agenda items see at: www.itu.int/md/R12-CPM15.02-R-0001/en**
- **Also available as WRC-15 Document 3**



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WRC-15 organization

Proposed preliminary draft WRC-15 structure

COM 1 **Steering**	COM 4 1.1; 1.2; 1.3; 1.4; 1.5*; 1.15; 1.16; 1.17; 1.18; 9.1.7; GFT*	COM 5 1.6; 1.7; 1.8*; 1.9; 1.10; 1.11; 1.12; 1.13; 1.14; 7*; 9.1.1; 9.1.2; 9.1.3; 9.1.5; 9.1.8; 9.2**; 9.3	COM 6 2; 4; 8; 9.1.4; 9.1.6; 9.2; 10
COM 2 **Credentials**	**WG 4A** 1.5*, 1.17, 1.18, GFT*	**WG 5A** 1.11, 1.12, 1.13, 1.14	**WG 6A** 2, 4, 8, 9.1.4, 9.1.6, 9.2**
COM 3 **Budget Control**	**WG 4B** 1.4, 1.15, 1.16	**WG 5B** 1.6, 1.7, 1.8*, 1.9, 1.10, 9.1.1	**WG 6B** 10
COM 7 **Editorial**	**WG 4C** 1.1, 1.2, 1.3, 3, 9.1.7	**WG 5C** 7*, 9.1.2, 9.1.3, 9.1.5, 9.1.8, 9.2**	

Thank you !