Evolving International Regulation on Satellite Services

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Radiocommunication Bureau

International Telecommunication Union

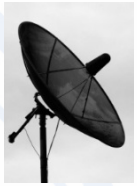
Inter-Agency Meeting on Outer Space Activities 2017

IMPORTANCE OF SATELLITE

Agriculture

Corporate networks

Maritime communication

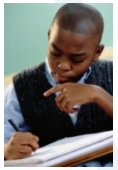


VSAT

Earth Observation

Aviation Security

Telemedicine



E-learning

Cellular Backhaul

Internet

Disaster Relief

Satnav

SNG

DTH

Global Flight Tracking

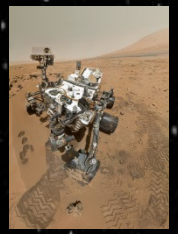
WHERE DO SATELLITES OPERATE …

GEO
35,786 km above equator

Molniya

Highly Elliptical Orbit – 40 000 km in apogee

MEO
8 000 - 20 000 km



LEO
400 - 2 000 km

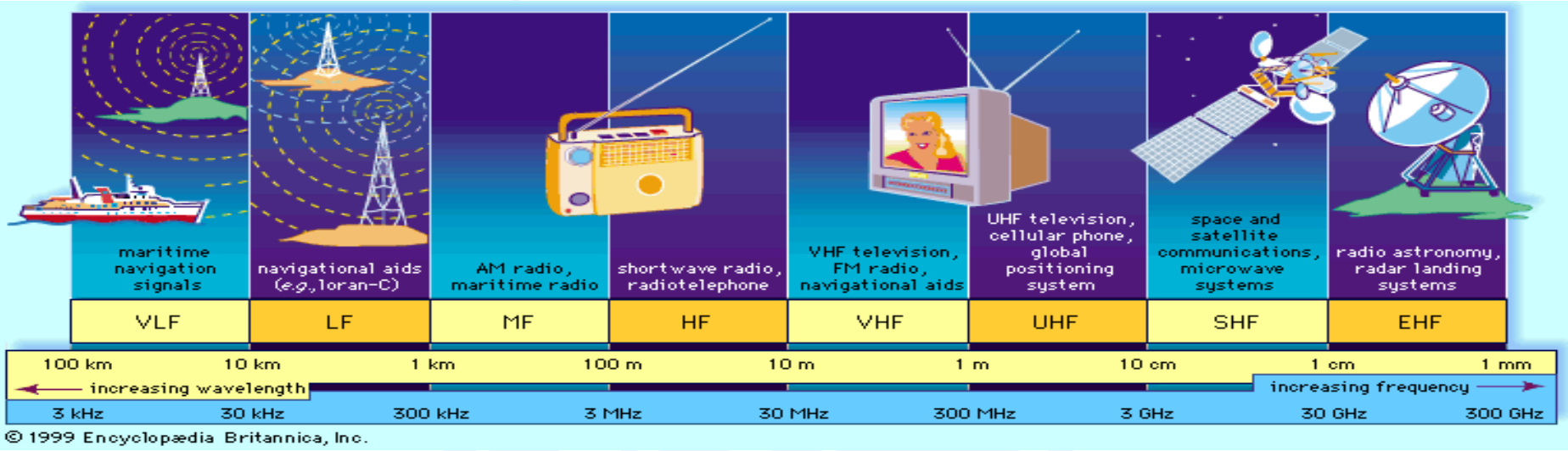
GNSS

International Space Station

Sub-orbital

FREQUENCY SPECTRUM

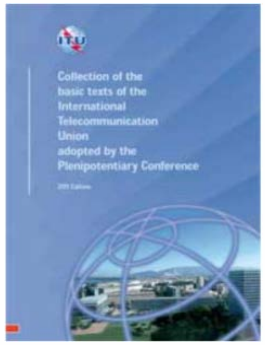
Limited natural resource



1.467 GHz to 1.492 GHz	1.518 GHz to 1.675 GHz	1.97 GHz to 2.69 GHz	3.4 GHz to 7.025 GHz	10.7 GHz to 14.5 GHz	17.3 GHz to 30 GHz
Satellite Audio Broadcasting to fixed and mobile units	Civilian Mobile-Satellite Services (two-way)	Satellite television & radio broadcasting to mobiles + two-way mobile services	Fixed-Satellite television, & data services (including broadcasting)	Fixed-Satellite television & data services (including broadcasting)	Fixed-Satellite television & data services (including broadcasting)

ITU CONSTITUTION (Art.1)

ITU shall **effect allocation of bands** of the radio-frequency spectrum, the allotment of radio frequencies and the **registration of radiofrequency assignments** and, for space services, of **any associated orbital position** in the geostationary-satellite orbit or of any associated characteristics of satellites in other orbits, in order to **avoid harmful interference** between radio stations of different countries



RADIO REGULATIONS

- Intergovernmental Treaty governing the use of spectrum/orbit resources by administrations
- Define the rights and obligations of Member States in respect of the use of these resources
- Recording of a frequency assignment in the Master Register (MIFR) provides international recognition

RADIO REGULATIONS

- Updated every 3-4 years by World Radiocommunication Conference (WRC)
- Complemented by Rules of Procedure, revised by Radio Regulations Board (RRB)

WRC-15

2 - 27 Nov 2015
Geneva

3275 Participants
162 Member states
130 other entities

40 Topics

678 Documents
2888 proposals
2/3 common proposals
(regional or multi-countries)

WRC-15 results for space services

New frequency bands for space services to increase capacity and accommodate new applications

- 13.4-13.65GHz in R1 for FSS downlink
- 14.5-14.75GHz 30 countries in R1&2 for FSS uplink
- 14.5-14.8GHz 9 counties in R3 for FSS uplink
- 7375-7750MHz downlink for MMSS
- 7190-7250MHz uplink for EESS
- 9200-9300MHz, 9900-10000MHz and 10-10.4GHz for EESS (active)

7375-7750 / 8025-8400 MHz for maritime-mobile satellite

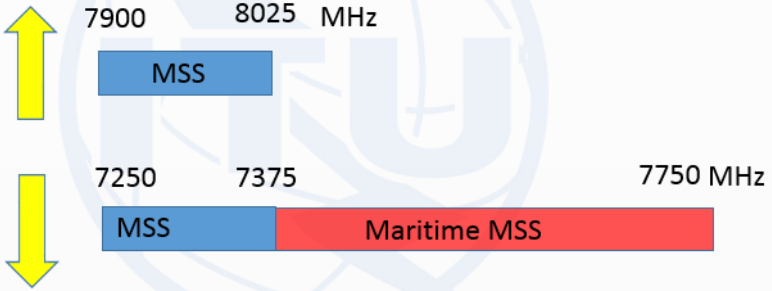
agenda item 1.9.2

Background

- spectrum shortfall for current and future applications in 7/8GHz

Results of WRC-15

- New allocation to MMSS in 7 375 – 7 750 MHz in the space-to-Earth direction
- No allocation for uplink in 8025-8400 MHz (traffic demand in uplink is much less and sharing with incumbent services is difficult)



Increase of 400% of spectrum in the downlink!

Conditions of utilization

- Limited to GSO
- Earth stations in MMSS shall not claim protection, nor constrain use of fixed and mobile stations, except aeronautical mobile. **5.43A** does not apply.

Implications

- Additional bandwidth for downlink data transmissions of the next-generation satellites in the MMSS

WRC-15 results for space services

Change of conditions for use to facilitate the use of the band

- Primary allocation of FSS for feeder link of N-GSO MSS in 5091-5150MHz without any time limitation
- Extension of use of smaller antenna for ESV in 5925-6425Hz
- Removal of 5km distance limitation for Extra Vehicular Activities in 410-420MHz
- Extension of the possibility offered for ESIM in all Regions in 19.7-20.2 GHz and 29.5-30 GHz

Earth Stations in Motion (ESIM)

- **Background**
  - **5.526** provides conditions for ESIM communications with GSO FSS space stations in 19.7-20.2 GHz and 29.5-30 GHz in Region 2 as well as 20.1-20.2 GHz and 29.9-30 GHz in Regions 1 and 3.

- **Results of WRC-15**
  - New **5.527A** and new Res. **156** to set conditions for ESIM communication with GSO FSS space stations in 19.7-20.2, 29.5-30.0 GHz in all Regions
  - This Res. complements the possibility offered for ESIM by **5.526** in the bands 19.7-20.2 GHz and 29.5-30 GHz in Region 2 and in bands 20.1-20.2 GHz and 29.9-30 GHz in Regions 1 and 3.
- **Implications**
  - Increased use and further development of ESIM in the frequency bands 19.7-20.2 and 29.5-30.0 GHz in all Regions with sufficient protection to other GSO satellite networks and terrestrial services

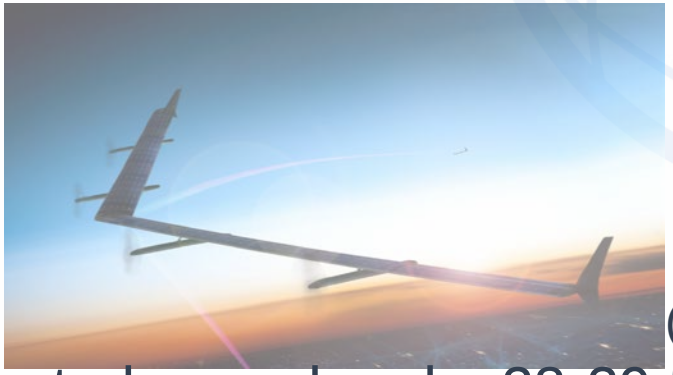
Agenda for the 2019 World Radiocommunication Conference to meet future demand

Broadband applications to be shared with space services
(WRC-19 agenda items 1.13 and 1.14)

The following bands 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**
- **47 - 47.2 GHz**
- **50.4 – 52.6 GHz**
- **31.8 – 33.4 GHz**
- **40.5 – 42.5 GHz**
- **45.5 – 47 GHz**
- **47.2 – 50.2 GHz**
- **66 – 76 GHz**
- **81 – 86 GHz**

► **Res. 238 (WRC-15)**



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

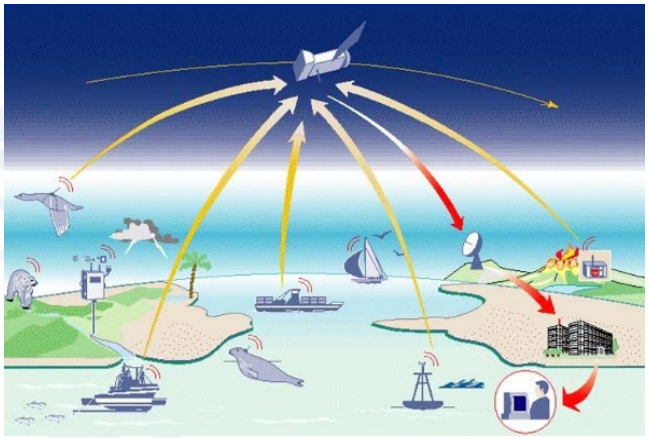
(*high-altitude platform stations (HAPS); *** in Region 2)

► **Res. 160 (WRC-15)**

Science issues (WRC-19 agenda items 1.2, 1.3 and 1.7)

Studies to consider **in-band power limits** for earth stations in **MetSat & EESS** @ **401-403 MHz** for DCS* and in the **MSS** @ **399.9-400.05 MHz**

► **Res. 765 (WRC-15)**



Studies to consider possible upgrading of the **2ndary MetSat (s-E)** allocation **to 1mary** status & a possible **1mary EESS (s-E)** allocation @ **460-470 MHz** for DCS

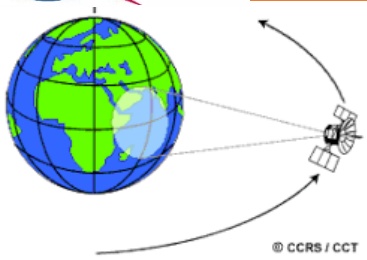
► **Res. 766 (WRC-15)**

Study spectrum needs for **TT&C in the SOS** for non-GSO satellites with short duration missions & consider, if necessary, new SOS allocations

► **Res. 659 (WRC-15)**

* Data Collection Systems (DCS) are used to monitor and predict climate change, monitor oceans, weather and water resources, weather forecasting and assisting in protecting biodiversity, improving maritime security

Satellite issues
(WRC-19 agenda items 1.4, 1.5, 1.6 & 7)



Consider results of studies on review, and possible revision if necessary, of RR App. **30** Annex 7 **limitations**, **incl. orbital position limitations**

► **Res. 557 (WRC-15)**

Studies to consider the **use of the bands 17.7-19.7 GHz (s-E) and 27.5-29.5 GHz (E-s)** by **earth stations in motion** communicating with GSO space stations **in the FSS** and take appropriate action

► **Res. 158 (WRC-15)**

Studies on development of a **regulatory framework for non-GSO FSS systems** that may operate in the bands **37.5-39.5 GHz (s-E), 39.5-42.5 GHz (s-E), 47.2-50.2 GHz (E-s) and 50.4-51.4 GHz (E-s)**

► **Res. 159 (WRC-15)**

Satellite Regulatory issues

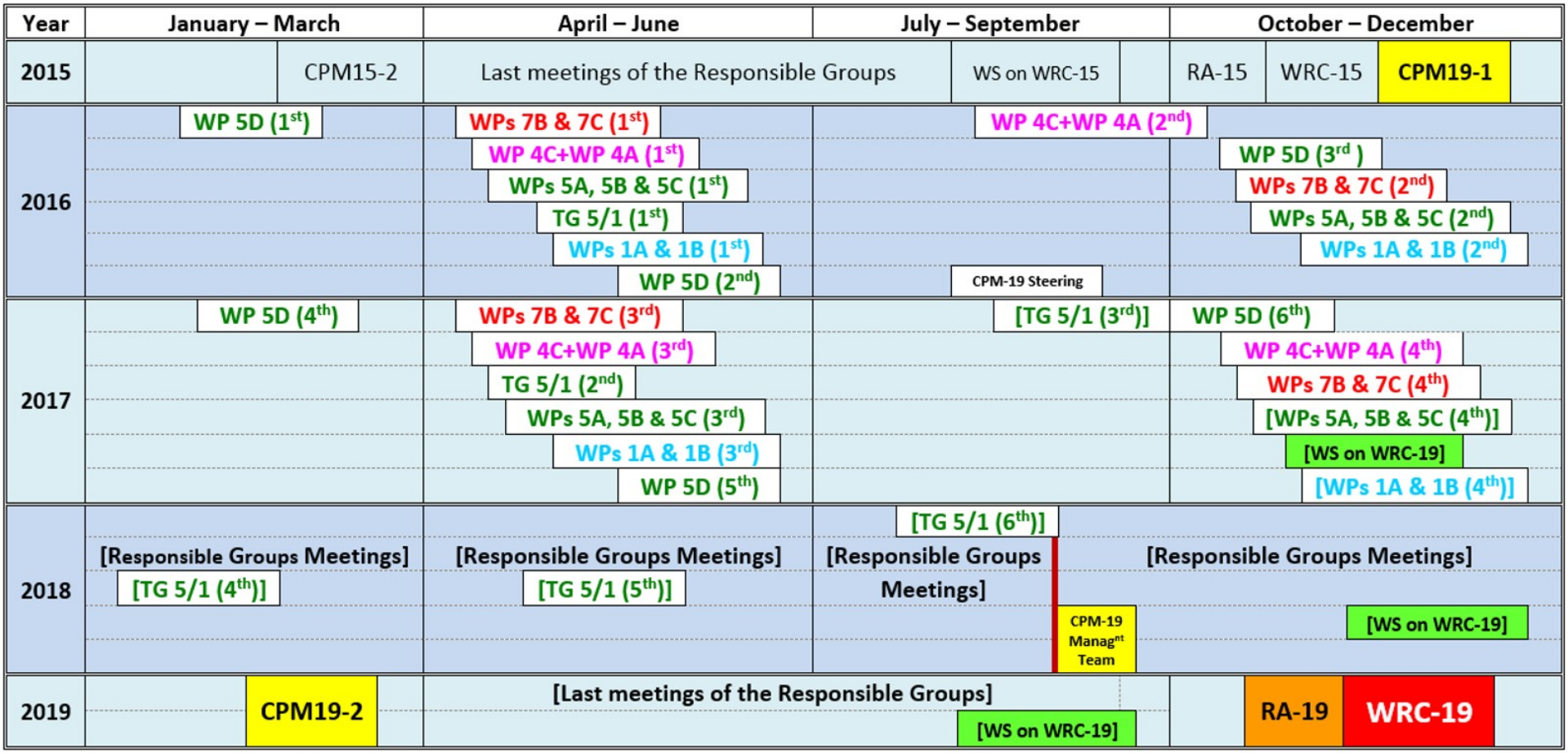
► **Res. 86 (Rev.WRC-07)**

Other ITU-R Studies for WRC-19 (WRC-19 agenda item 9.1)

9.1.1	Res. 212 (Rev.WRC-15) – Terrestrial & Satellite components of IMT co-existence & compatibility @1885-2025 & 2110-2200 MHz
9.1.2	Res. 761 (WRC-15) – IMT and BSS sound @ 1452-1492 MHz in Regions 1 and 3
9.1.3	Res. 157 (WRC-15) – Technical/Operational/Regulatory studies for new N-GSO Sat. in "C-Band" allocated to FSS
9.1.4	Res. 763 (WRC-15) – Stations on board sub-orbital vehicles
9.1.5	Res. 764 (WRC-15) – IbR* of Rec. ITU-R M.1638-1 & M.1849-1 (MS(RLAN)@5GHz & new radar characteristics)
9.1.6	Res. 958 (WRC-15) – 1) Urgent studies on Wireless Power Transmission (WPT) for electric vehicles
9.1.7	Res. 958 (WRC-15) – 2) Managing unauthorized operations of Earth Station terminals
9.1.8	Res. 958 (WRC-15) – 3) Narrowband & BB machine-type communication infrastructures
9.1.9	Res. 162 (WRC-15) – FSS needs @ 51.4-52.4 GHz

* Incorporation by Reference

Overview of the ITU-R Calendar towards WRC-19



[…] = planned meetings

WS on WRC-19 = ITU Inter-regional Workshop on WRC-19 Preparation

Up-to-date information online at: www.itu.int/en/events/Pages/Calendar-Events.aspx?sector=ITU-R