WRC-15 Outcome?

Some decisions related to Space services

Attila MATAS

matas@itu.int @AttilaMatas

Head, Space Publication and Registration division,
Space Services Department
ITU - Radiocommunication Bureau

Committed to connecting the world

KEY POINTS to remember

- Any flying object in outer space ***without*** *a proper radiocommunication channel* is *just a dangerous piece of flying metal* (debris)

- It is important to ensure that *any* outer space radio operation *avoids harmful interference (HI)* **to / from** other systems and services

- It is important to ensure the *availability and protection* **from** *harmful interference* of the frequencies provided for *distress and safety purposes*

➢ **Is there a solution ?**
YES *– Apply and Follow the ITU Radio Regulations !*

ITU RADIO REGULATIONS 110 1906 - 2016 ANNIVERSARY

Since 1906…

Today more than 1000 pages

1963

First Extra-ordinary Administrative Radio Conference to allocate frequency bands for *space radiocommunication purposes*

Legal Framework for Orbit/Spectrum Access/Use

UN Outer Space Treaty 1967

The UN recognizes the ITU as the specialized agency *responsible* for taking such action as may be appropriate under its basic instrument for the accomplishment of the purposes set forth therein

(Constitution (CS), Convention (CV), Radio Regulations (RR), Rules of Procedures (RoP), Recommendations (REC))

- **Principles of use of orbit/spectrum**
- **Allocation of frequency bands**
- **Regulatory Procedures and Plans**
- **Operational measures**

Legal Framework for Orbit/Spectrum Access/Use

ITU Constitution – Articles 44 and 45

Objectives:

- *To ensure the rational, equitable, efficient and economical use of the radio-frequency spectrum and satellite-orbit resources*

in conformity with the provisions of the Radio Regulations, so that countries or groups of countries may have equitable access to those orbits and frequencies, taking into account the special needs of the developing countries and the geographical situation of particular countries

- ***To avoid harmful interference***
- To establish global standards to assure the necessary required performance, interoperability and quality

Legal Framework for Orbit/Spectrum Access/Use

UN
Outer Space instruments
(*on space objects*)

ITU
Instruments
(*on radio frequencies*)

Free "exploration and use"
OST Art. I
under international law

→ **Equitable** access and **rational** use of spectrum *under international law* CS ART 44

Art. VI **States**
"responsibility" & "licensing"
Art. VIII "jurisdiction & control"

→ **States**
must **license** transmitting radio stations RR ART 18
shall **not cause harmful interference** CS ART 45 RR ART 15

States
Art. VIII Registration OOSA

→ **States** RR ART 9, 11
API_CR/C_MIFR

Art. VII States
"liable" for **damage**

→ *No liability clauses*

ITU Radio Regulations

- Intergovernmental Treaty, *legal bindings* on all Member states, governing the *use of spectrum/orbit resources by all radiocommunication services*

- Define the *rights* and *obligations* of Member states in respect of the use of spectrum/orbit resources

- The ITU Radio Regulations incorporates the decisions of World Radiocommunication Conference (WRC)

World Radio Conference (WRC)

- WRC performs a complete and detailed review of the Radio Regulations (RR) and its Rules of Procedure (RoP)

- WRC updates RR considering technological developments on spectrum utilization and needs by the radiocommunication services and ITU-R sector studies, realities and challenges, to respond *early* and *appropriately* to these changes.

- **ONLY WRC** *has the authority to modify the RR* by addenda, modifications or deletions they deem pertinent. These modifications are made by consensus, and only if necessary, would vote (one vote per administration).

International Telecommunication Union

WORLD RADIOCOMMUNICATION CONFERENCE 2015

GENEVA, SWITZERLAND
2 – 27 NOVEMBER 2015

www.itu.int/go/ITU-R/WRC-15

150 1865 2015

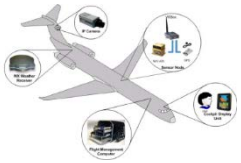
Photo credit: Shutterstock

Topics on WRC-15 Agenda Items

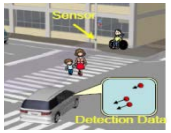
Mobile Broadband
(IMT < 6GHz, UHF band, PPDR)

Maritime (AIS, UHF On-board Coms)

Aeronautical (UAS, WAIC, GFT)



Automotive Radar (RLS@78Ghz)

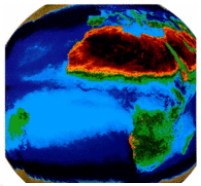


Amateur radio for emergency @ 5 MHz

Satellite allocations (FSS @ 10-17 GHz FSS&MMSS @ 7/8GHz MSS @ 22-26GHz)

UTC leap second

Space Research



Climate monitoring

Weather forecast

Regulatory (Sat. regulations, harmonization of spectrum use, etc.)

WRC-15 key facts

- **3275** participants attended WRC-15, including:
  - **2780** *participants* from **162** Member States, and
  - **795** *observers* representing **130** other entities, including industry
- **19** Agenda items and **GFT**
- **678** Documents including 2888 proposals were submitted before WRC-15. 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
- *Paperless World conference* in **6** Languages

http://www.itu.int/go/wrc-15

Item 5 of the **LS-2016** Agenda:

- **Information on the activities of international intergovernmental and non-governmental organizations relating to space law**

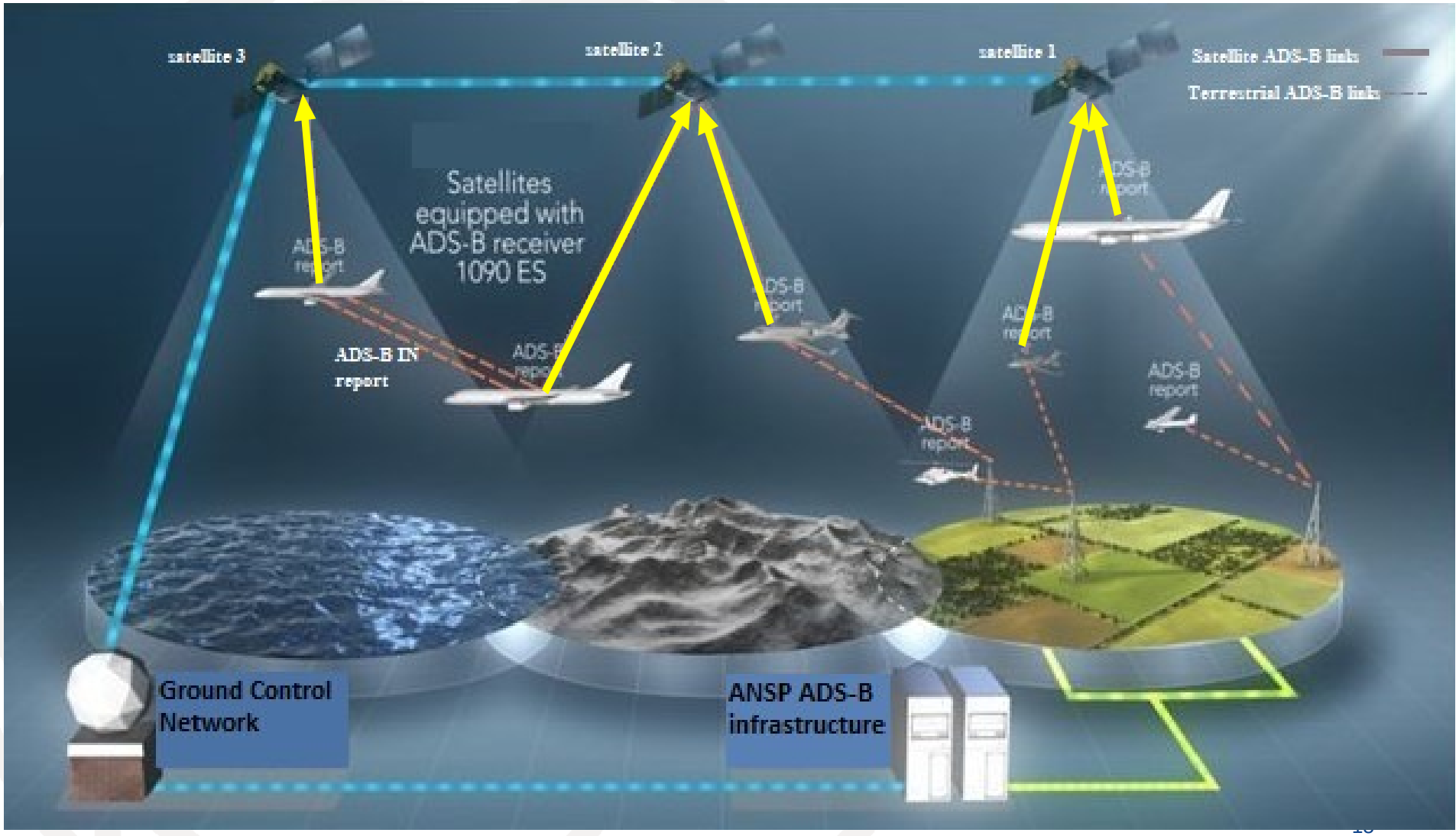
WRC-15 AI.GFT Decision

RES-425 [COM4/2] (WRC-15) - Use of the freq band 1 087.7-1 092.3 MHz by the aeronautical mobile-satellite (R) service (Earth-to-space) to facilitate global flight tracking (GFT) for civil aviation

- *Current ATC can't go beyond the LOS of terrestrial radar or ADS-B stations*, leaving the vast majority of the planet without ATC traffic surveillance
- This WRC-15 historical decision about the GFT will extend ATC surveillance coverage of ADS-B equipped aircraft from the *30 percent terrestrial coverage* available today to *100 percent (global coverage) of the earth's surface*

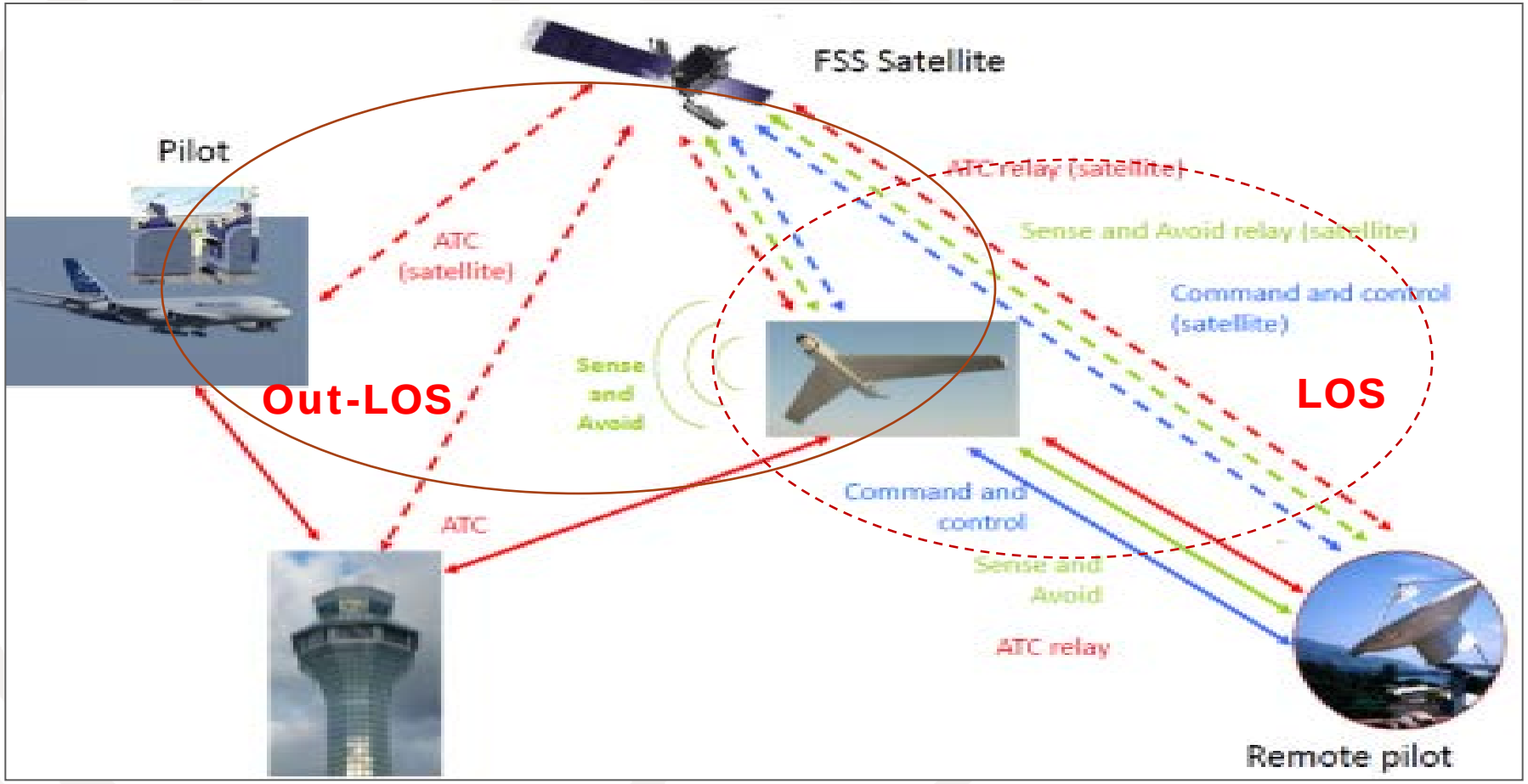
WRC-15 AI.GFT Decision

Seamless satellite based ADS-B – GFT - world wide



WRC-15 - AI 1.5 - UAS

AI.1.5 - Unmanned Aircraft Systems (UAS) – Consider use of FSS bands for control and non-payload communications (CNPC) of UAS in *non-segregated* airspaces in accordance with RES 153 (WRC-12)



WRC-15 AI.1.5-UAS Decision

RES-155 [COM4/5] (WRC-15) Regulatory provisions related to earth stations on board of UAS which operate with geostationary-satellite networks in the fixed-satellite service in certain frequency bands for the control and non-payload communications (CNPC) of UAS in non-segregated airspaces

UAS CNPC links will operate in accordance with international *Standards and Recommended Practices and Procedures* established *in accordance with the Convention on International Civil Aviation*

1. *that assignments to stations of geostationary FSS satellite networks operating in the frequency bands .....GHz and may be used for UAS CNPC links in non-segregated airspace*
2. *that ES in motion on board UAS may communicate with the FSS satellite network operating in the frequency bands...*

WRC-15 AI.1.13 – EVA - Decision

AI.1.13 to review No. **5.268** with a view to examining the possibility for increasing the 5 km distance limitation and allowing space research service (space-to-space) use for proximity operations by space vehicles communicating with an orbiting manned space vehicle, in accordance with RES **652** (WRC-12)

MOD No. **5.268** – WRC-15 decided to modify RR No. 5.268 *to remove the 5 km distance limitation* and not solely limit the use of the frequency band 410-420 MHz for extra-vehicular activities.

WRC-15 AI.1.14 – UTC - Decision

RES **655** [COM5/1] **(WRC-15) Definition of time scale and dissemination of time signals via radiocommunication systems**

resolves

that until **WRC-23**, UTC as described in Recommendation ITU-R **TF.460-6** shall continue to apply, and *for most practical purposes* associated with the Radio Regulations, **UTC** ***is equivalent*** *to mean solar time* (**UT**) *at the prime meridian (0° longitude), formerly expressed in GMT*

The UTC scale is adjusted by the insertion or deletion of seconds (positive or negative leap seconds) *to ensure approximate agreement with UT.*

Item 7a of the **LS-2016** Agenda:

- **The definition and delimitation of outer space**

WRC-15 AI.7 – Satellite issues

- **Several ADM request clarification from the Bureau related to *satellite launch vehicles* or *sub-orbital flight vehicles***

- **From the technical description, operational parameters as well as spectrum requirements, *these new projects may not be fitting with the current aeronautical terrestrial or space service regulatory description and associated procedures* for *protection from HI and international recognition* of the use of relevant frequency assignments…..**

WRC-15 AI.7 – Satellite issues

- Report of the Director on the activities of the ITU-R Sector *Part 2:* Experience in the application of the radio regulatory procedures: 3.2.1.4 Launch vehicles and Sub-orbital flights
- The boundary between the Earth's atmosphere and space is usually assumed to be 100 km above the Earth's surface
- Some vehicles, including aircraft, are being developed which can fly at altitudes of over 100 km into sub-orbital trajectories
- Other vehicles may also operate at altitudes over 100 km and use non-orbital trajectories
- The current regulatory provisions and procedures for terrestrial and space services may not be adequate for *protection from HI* and international recognition of the use of relevant frequency assignments by stations on board of these vehicles

WRC-15 AI.7 – Satellite issues

ITU Radiocommunication Assembly RA-15 decision
QUESTION ITU-R 259/5

Operational and radio regulatory aspects for planes operating in the upper level of the atmosphere

1. How will planes be operated including a description of the various phases of flight?
2. During which phases of flight described in *decides 1*, will, if at all, need to be supported by air traffic control systems and what sort of systems are expected?
3. What radio links will be required to support planes operations and under what radiocommunication service definition will they fall?

RESOLUTION 763[COM5/7] (WRC-15)
Stations on board sub-orbital vehicles

- The spectrum requirements for TT&C and voice communications on stations on board sub-orbital vehicles have not been studied
- Provisions of No. 4.10 *(safety aspect)* may apply for certain aspects of these operations

- *resolves*

1. to conduct studies to *identify any required technical and operational measures*, in relation to stations on board sub-orbital vehicles, *that could assist in avoiding harmful interference between radiocommunication services*

2. to conduct studies to *determine spectrum requirements* and, based on the outcome of those studies, to consider a possible future agenda item for WRC-23

Item 7b of the **LS-2016** Agenda:

- The character and utilization of the geostationary orbit, including consideration of ways and means to ensure the rational and equitable use of the geostationary orbit without prejudice to the role of the International Telecommunication Union

WRC-15 AI.1.1 IMT Decision

AI.1.1 *- To consider additional spectrum allocations to the mobile service on a primary basis and identification of additional frequency bands for International Mobile Telecommunications (IMT) and related regulatory provisions, to facilitate the development of terrestrial mobile broadband applications, in accordance with Resolution 233 (WRC-12).*

- WRC-15 identified the band 1427-1518 MHz for IMT, requesting the ITU-R to determine the technical measures to ensure compatibility with the mobile-satellite service operations in the adjacent band
- **C-band: WRC-15 reconfirmed the need to protect critical fixed-satellite service**
  - The lower 200 MHz of the C-band downlink frequencies 3400-3600 MHz were identified for IMT in ITU Regions 1 and 2
  - In Region 3 *some* ADM allowing potential IMT use of these 200 MHz by a footnote
  - **NOC was adopted in the band C-band downlink 3600-4200 MHz**
  - *Only in Region 2 in the band 3600-3700 MHz few countries identified IMT by a footnote*
- **NOC was adopted in the C-band uplink 5925-6425 MHz**

WRC-15 AI.7 *Satellite issues* Decision

- **Removal of API as of 1.1.2017** – RES **31** [COM5/3] (WRC-15) **Transitional measures for the elimination of Advance Publication Information (API) filings by administrations for frequency assignments to satellite networks and systems subject to Section II of Article 9**

- RES **40** [COM5/4] (WRC-15) **Use of one space station to bring frequency assignments to geostationary satellite networks at different orbital locations into use within a short period of time**

- MOD **11.44/11.44B** (Bringing into use of assignment to a space station)
- MOD **11.49** (Suspension of assignment to a space station)
- MOD **13.6** (Maintenance of the Master Register by the Bureau)

WRC-15 AI.7 *Satellite issues* Decision

NEW – RES **156** [COM5/2] (WRC-15) Use of the frequency bands 19.7-20.2 GHz and 29.5-30.0 GHz by *earth stations in motion* communicating with geostationary space stations in the fixed-satellite service

- there is a need for global broadband mobile-satellite communications, and that some of this need could be met by allowing earth stations in motion to communicate with space stations of the fixed-satellite service (FSS)

resolves

- *earth stations in motion communicating with the GSO FSS shall remain within the envelope of the coordination agreements of the satellite networks* with which this earth station is associated…

Item 14 of the **LS-2016** Agenda:

- **General exchange of views on the application of international law to *small satellite activities***

WRC-15 AI.9.1 – Small satellites

AI.9.1.8 To consider and approve the Report of the Director of the Bureau - Regulatory aspects for nanosatellites and picosatellites

- **RES 757 (WRC-12)** Regulatory aspects for nano- and picosatellites

to consider whether modifications to the regulatory procedures for notifying satellite networks are needed to facilitate the deployment and operation of nano- and pico satellites and to take the appropriate actions

- The ITU-R Study Groups have concluded:
  - additional efforts should be undertaken by the Bureau, ADM, and others to help increase knowledge and raise awareness about the applicable regulatory procedures for satellite networks among those entities involved in development and launch small satellites
  - ***NO NEED for modifications to the regulatory procedures*** for notifying satellite networks to accommodate nanosatellite and picosatellite missions

- RA-15 **RES ITU-R 68** Improving the dissemination of knowledge concerning the applicable regulatory procedures for small satellites, including nanosatellites and picosatellites

WRC-15 AI.9.1 *Small Satellite* Decision

- **SUP – RES 757 (WRC-12)**
- **NEW – RES 659 [COM6/19] (WRC-15)** *Studies to accommodate requirements in the space operation service for non-geostationary satellites with short duration missions*

➢ the term "short duration mission" used in this resolution refers to a satellite mission having a limited period of validity of not more than typically three years;

➢ examples of such satellites with *technical characteristics* are given in Report ITU-R **SA.2312**;

➢ Report ITU-R **SA.2348** provides an overview of the *current practice and procedures for notifying space networks* currently applicable to these satellites;

➢ *invites ITU-R*

1. *to study the spectrum requirements for telemetry, tracking and command in the space operation service for the growing number of non-GSO satellites with short duration missions*
2. *to assess the suitability of existing allocations to the space operation service in the frequency range below 1 GHz*
3. *if requirements cannot be met, to conduct sharing and compatibility studies within the frequency ranges 150.05-174 MHz and 400.15-420 MHz,*

Are you interested to learn more about small satellites?

See results of the *First* ITU Symposium and Workshop on small satellite regulation and communication systems

Prague, Czech Republic
2-4 March 2015

JOIN US !!

Second ITU Symposium and Workshop on *small satellite regulation and communication systems*
Santiago de Chile, Chile
21-23.09.2016

http://www.itu.int/GO/ITU-R/Prague-2015

Free online access to ITU-R information

- World Radiocommunication Conference (**WRC**)

  http://www.itu.int/ITU-R/go/wrc/en

- ***ITU-Radio Regulations @ 2012***

  http://www.itu.int/pub/R-REG-RR-2012

- ***ITU-R Recommendations***

  http://www.itu.int/publ/R-REC/en