

**2<sup>nd</sup> ITU INTER-REGIONAL WORKSHOP  
ON WRC-15 PREPARATION  
(Geneva, 12 – 13 November 2014)**

**Science Issues  
Panel-3 Discussions on  
WRC-15 Agenda items  
1.11, 1.12, 1.13, 1.14**

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for Chapter 2***

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PREPARATION**

**GENEVA, SWITZERLAND  
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[www.itu.int/go/ITU-R/WRC-15-irwsp-14/](http://www.itu.int/go/ITU-R/WRC-15-irwsp-14/)



# Chapter 2 of the Draft CPM Report

## Science issues

### Rapporteur

**Mr. Alexandre Vassiliev (Russian Federation)**

### WRC-15 Agenda items

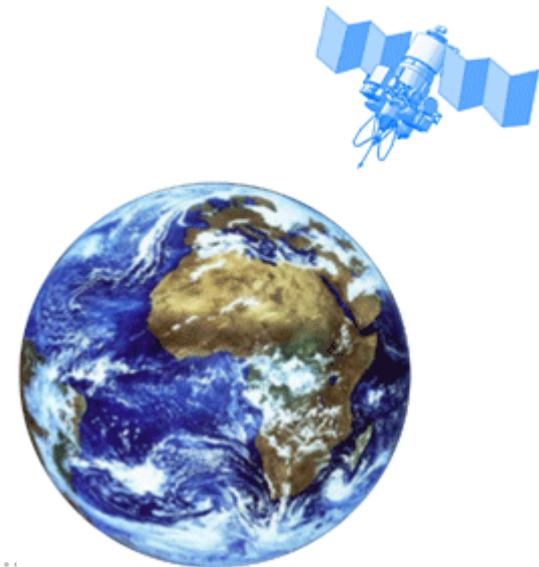
**1.11, 1.12, 1.13, 1.14**

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- 1.11 to consider a primary allocation for the Earth exploration-satellite service (Earth-to-space) in the 7-8 GHz range;
  - 1.12: to consider an extension of the current worldwide allocation to the Earth exploration-satellite (active) service in the frequency band 9 300-9 900 MHz by up to 600 MHz within the frequency bands 8 700-9 300 MHz and/or 9 900-10 500 MHz;
  - 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;
  - 1.14: to consider the feasibility of achieving a continuous reference time-scale, whether by the modification of coordinated universal time (UTC) or some other method, and take appropriate action.

**to consider a primary allocation for the Earth exploration-satellite service (Earth-to-space) in the 7-8 GHz range, in accordance with Res. 650 (WRC-12)**

## Goal:

The EESS requires an additional Earth-to-space allocation in the frequency range 7-8 GHz to allow the further development and use of EESS systems employed for different Earth exploration purposes. Using the existing space-to-Earth allocations near 8 GHz it would also allow employ a single transponder for both uplinks and downlinks, reducing design and launch cost.



# Draft Methods to satisfy AI 1.11

## 3 methods:

**Method A:** Allocate the frequency band 7 190-7 250 MHz to the EESS (Earth-to-space) and modify RR Article 5:

- option 1: - for non-geostationary EESS systems only;
- option 2: - EESS geostationary systems shall not claim protection from existing and future stations of the FS and the MS, No.5.43A not applied;
- option 3: - same as option 1 + restrict the use to the operation of EESS spacecraft;

modify RR Article 21 (Tables 21-2, 21-3) and Appendix 7 (Table 7B).

**Method B:** Allocate the frequency band 7 190-7 250 MHz to the EESS (Earth-to-space) limited to non-geostationary systems; coordination with SOS systems in the frequency band 7 190-7 235 MHz - RR No. 9.11A and no protection from SRS stations; modify RR Article 21 (Tables 21-2, 21-3) and Appendix 7 (Table 7B);

**Method C:** No change.

***All methods propose suppression of Resolution 650 (WRC-12).***

**to consider an extension of the current worldwide allocation to the EESS (active) in the frequency band 9 300-9 900 MHz by up to 600 MHz within the frequency bands 8 700-9 300 MHz and/or 9 900-10 500 MHz, in accordance with Res. 651 (WRC-12)**

## Goal:

To enable a better resolution in the Earth exploration-satellite service systems, as well as to improve the actual imaging and monitoring geoinformation systems used for:

- disaster relief and humanitarian aid;
- safety of energy supply, as monitoring of oil and gas production sites as well as pipeline networks;
- land use and large area coastal surveying.

To be achieved by increasing space born radar image resolution (higher than 0.5 meter) that requires wider bandwidth.



# Draft Methods to satisfy AI 1.12

## 2 methods:

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**Method A:** Allocate the frequency band 9 900-10 500 MHz to the EESS (active) and modify RR Article 5:

- **Method A1:** EESS systems shall not cause harmful interference nor claim protection from RLS stations; extension shall be used by EESS systems requiring bandwidth more than 600 MHz; protect RAS stations in the frequency band 10.6-10.7 GHz;
- **Method A2:** include in RR a pfd-limit for EESS systems in order to protect FS systems; protect RAS stations.

**Method B:** Allocate the frequency bands 9 200-9 300 MHz and 9 900-10 400 MHz to the EESS (active); extension shall be used by EESS systems requiring bandwidth more than 600 MHz; protect RAS stations.

***All methods propose suppression of Resolution 651 (WRC-12).***

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)

## Goal:

To allow the use of the frequency band 410-420 MHz for communications between space vehicles (manned or robotic) approaching manned space vehicles during proximity operations and during docking maneuvers over distance longer than 5 km.



## 1 method only:

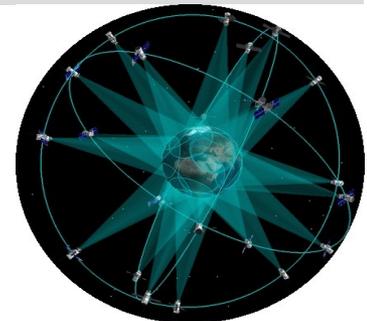
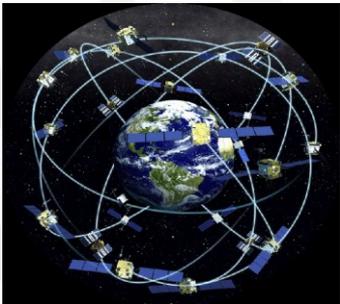
**Modify RR No. 5.268 to remove the 5 km distance limitation and not solely limit the use of the frequency band 410-420 MHz for extra-vehicular activities. Resolution 652 (WRC-12) should be consequentially suppressed.**

5.268 Use of the frequency band 410-420 MHz by the space research service is limited to space-to-space communications with ~~within 5 km of~~ an orbiting, manned space vehicle. The power flux-density at the surface of the Earth produced by emissions from ~~extra-vehicular activities~~ transmitting stations of the space research service (space-to-space) in the frequency band 410-420 MHz shall not exceed  $-153 \text{ dB(W/m}^2\text{)}$  for  $0^\circ \leq \delta \leq 5^\circ$ ,  $-153 + 0.077 (\delta - 5) \text{ dB(W/m}^2\text{)}$  for  $5^\circ \leq \delta \leq 70^\circ$  and  $-148 \text{ dB(W/m}^2\text{)}$  for  $70^\circ \leq \delta \leq 90^\circ$ , where  $\delta$  is the angle of arrival of the radio-frequency wave and the reference bandwidth is 4 kHz. ~~No. 4.10 does not apply to extra-vehicular activities.~~ In this frequency band stations of the space research (space-to-space) service shall not claim protection from, nor constrain the use and development of, stations of the fixed and mobile services. **No. 4.10 does not apply.** (WRC-1597)

**to consider the feasibility of achieving a continuous reference time-scale, whether by the modification of coordinated universal time (UTC) or some other method, and take appropriate action, in accordance with Res. 653 (WRC-12)**

## Goal:

**To study feasibility of the introduction a continuous time-scale in order to avoid the occasional insertion of leap seconds and study the effects of possible implementation of a continuous reference timescale (including technical and operational factors).**



# Draft Methods to satisfy AI 1.14

## 3 methods:

**Method A:** Introduce continuous reference time-scale and stop insertion of leap second:

- Method **A1**: stop the insertion of leap seconds in UTC to be effective no less than five years after the date of entry into force of the Final Acts of the WRC-15;
- Method **A2**: similar to A1 but also change the name of UTC.

**Method B:** Retain UTC as currently defined and introduce a continuous reference atomic time-scale based on TAI with an offset to be broadcasted on an equal basis.

**Method C:** No change to UTC:

- Method **C1**: No change UTC definition in Rec. ITU-R TF.460-6, UTC will remain the only time-scale that is broadcasted;
- Method **C2**: similar to C1 but also Rec. ITU-R TF.460-6 would be amended to allow using continuous system time-scales in addition.

***All methods propose suppression of Resolution 653 (WRC-12).***