



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

**Satellite Allocation
Issues (FSS)**

**Panel-5 Discussions on
WRC-15 agenda items
1.6, 1.7, 1.8, 1.9.1**

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WORKSHOP ON WRC-15
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**GENEVA, SWITZERLAND
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Chapter 4.1,
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AI 1.6 – To consider possible additional primary allocations:

AI 1.6.1 – Primary FSS allocation (Earth-to-space and space-to-Earth) of 250 MHz in the range between 10 GHz and 17 GHz in Region 1

AI 1.6.2 – Primary FSS allocation (Earth-to-space) of 250 MHz in Region 2 and 300 MHz in Region 3 within the range 13-17 GHz

AI 1.7 – Review the use of 5 091-5 150 MHz by FSS (Earth-to-space), limited to feeder links of the non-GSO MSS systems

AI 1.8 – Review the provisions relating to earth stations located on board vessels (ESVs)

AI 1.9.1 – Consider possible new allocations to FSS in 7 150-7 250 MHz (space-to-Earth) and 8 400-8 500 MHz (Earth-to-space)

1ST ITU Inter-regional Workshop on WRC-15 Preparation:

1. The issues on primary FSS allocations were introduced in technical, operational and regulatory aspects
2. Further studies are required for agenda items 1.6, 1.8 and 1.9.1
3. No methods for the draft CPM Report had been determined for agenda items 1.6, 1.8 and 1.9.1

2nd ITU Inter-regional Workshop on WRC-15 Preparation:

The draft CPM Report was finalized

The required technical studies are being finalized

Focus on the draft Methods to satisfy the agenda items

Consideration of a primary FSS allocation (Earth-to-space and space-to-Earth) of 250 MHz in the range between 10 GHz and 17 GHz in Region 1

1. Draft Methods to satisfy the agenda item:

- a) In all methods, only possibilities for **GSO satellite networks** for the primary FSS allocation are analyzed.
- b) **11 frequency ranges were examined** in the sharing analysis, where 22 FSS links in both Earth-to-space and space-to-Earth directions are included.
- c) the draft Methods are given for **5 specific frequency ranges** which include **9 sharing cases**:
 - The **Method 1** in the various frequency ranges proposes **no new primary allocation for the FSS**
 - The **Method 2** proposes **new primary FSS allocation** to RR Art. 5

Method Table

Sub-band frequency (GHz)	Assigned method “letters”	
	Earth-to-space	Space-to-Earth
10.00-10.50	A	<u>AA (AA1, AA2)</u>
10.50-10.60	B	BB
10.60-10.68	C	CC
13.25-13.40	D	DD
13.40-13.75	<u>E (E1, E2)</u>	<u>EE (EE1, EE2)</u>
14.50-14.80	<u>F (F1, F2)</u>	<u>FF (FF1, FF2)</u>
14.80-15.35	<u>G (G1, G2)</u>	<u>GG (GG1, GG2)</u>
15.35-15.40	H	HH
15.40-15.70	<u>I (I1)</u>	<u>II (II1)</u>
15.70-16.60	J	JJ
16.60-17.00	K	KK

2. Draft Method 2 in the Earth-to-space direction:

Frequency band	Method
all bands in Method 2	Modification of RR Art.5 to make a primary FSS allocation
<u>13.4-13.75 GHz</u> (13.5-13.75 GHz in Reg.1)	<ol style="list-style-type: none"> 1) Setting up PSD limitation (-53.5 dB(W/Hz))for the transmission of FSS E/S 2) Modification to RR No. 5.502 to only extend minimum FSS E/S antenna limitation to the band it applies 3) Modification of RR No.5.501A or add new provision, and apply RR No.9.17A to protect existing SRS (DRS) systems (SRS feeder downlinks) with regard to FSS 4) Modification of Table 7b of RR App.7 to extend coordination trigger of FSS E/S with respect to RLS and RNS
<u>14.5-14.8 GHz</u>	<ol style="list-style-type: none"> 1) unplanned primary FSS allocation is proposed on a global basis; 2) include coordination trigger in RR App.5 under RR No.9.7 between assignments not subject to RR AP 30A; 3) modification of Art.4 and 7 of App.30A to define the procedure for coordination of an unplanned FSS assignments vis-à-vis assignments in, or proposed modifications to, App.30A Plan/List; 4) revisions of Annexes 1 and 4 for triggering the coordination as in 3); 5) regarding the coordination of unplanned FSS with respect to MS, using current coordination procedures OR developing a new Resolution describing the procedures; 6) regarding the coordination of unplanned FSS with respect to DRS in the SRS, grandfathering method is proposed.
<u>14.8-15.35 GHz</u> (14.8-15.05 GHz in Reg.1)	<ol style="list-style-type: none"> 1) to protect existing SRS systems with regard to FSS through new and/or modified regulatory provisions 2) modification of Table 7b of RR App.7 to extend coordination trigger of FSS E/S with respect to RLS and RNS

3. Draft Method 2 in the space-to-Earth direction:

Frequency band	Method
all bands in Method 2	<ol style="list-style-type: none"> 1) Modification of RR Art.5 to make a primary FSS allocation 2) Modification of RR Art.21 Table 21-4 by setting up PFD limits produced by GSO FSS satellites
<u>13.4-13.75 GHz</u> (13.4-13.65 GHz in Reg.1)	<ol style="list-style-type: none"> 1) Protect existing SRS (DRS) systems with regard to FSS by means of grandfathering method: adding new provisions and/or modifying current provisions 2) Modification of Table 8c of RR App.7 to compute the coordination distance between receiving FSS E/S and transmitting station of incumbent FS and MS/AMS services
<u>14.5-14.8 GHz</u>	<ol style="list-style-type: none"> 1) Protect existing SRS (DRS) systems with regard to FSS by means of grandfathering method: adding new provisions and/or modifying current provisions 2) Modification of Table 8c of RR App.7 to compute the coordination distance between receiving FSS E/S and transmitting station of incumbent FS and MS/AMS services 3) Modification RR No.21.2.1, specifying the separation of the direction of the maximum gain of FS receiving antennas from GSO orbit by at least 1.5 degrees 4) For opposite transmission of FSS, RR No.9.17A will apply
<u>14.8-15.35 GHz</u> (part of this band in Reg.1)	<ol style="list-style-type: none"> 1) Protect existing SRS (DRS) systems with regard to FSS by means of grandfathering method: adding new provisions and/or modifying current provisions 2) Modification of Table 8c of RR App.7 to compute the coordination distance between receiving FSS E/S and transmitting station of incumbent FS and MS/AMS services 3) Modification RR No.21.2.1, specifying the separation of the direction of the maximum gain of FS receiving antennas from GSO orbit by at least 1.5 degrees

Consideration of a primary FSS allocation (Earth-to-space) of 250 MHz in Region 2 and 300 MHz in Region 3 within the range 13-17 GHz.

1. Draft Methods to satisfy the agenda item:

- a) In all methods, only possibilities for **GSO satellite networks** for the primary FSS allocation are analyzed.
- b) **8 frequency ranges were examined** in the sharing analysis in the Earth-to-space direction
- c) So far, the draft Methods are given for **these 8 frequency ranges:**
 - The **Method 1** in the various frequency ranges proposes **no new primary allocation for the FSS**
 - The **Method 2** proposes **new primary FSS allocation** to RR Article 5

Method Table

Sub-band frequency (GHz)	Assigned method “letters”
13.25-13.40	<u>D (D1)</u>
13.40-13.75	<u>E (E1, E2)</u>
14.50-14.80	<u>F (F1, F2)</u>
14.80-15.35	<u>G (G1, G2)</u>
15.35-15.40	<u>H (H1)</u>
15.40-15.70	<u>I (I1)</u>
15.70-16.60	<u>J (J1)</u>
16.60-17.00	<u>K (K1)</u>

2. Draft Method 2 to satisfy the agenda item

Frequency band	Method
All bands in Method 2	1) Modification of RR Art.5 to make a primary FSS allocation
<u>13.5-13.75 GHz in Region 2</u> and <u>13.45-13.75 GHz in Region 3</u>	1) Setting up PSD limitation (-53.5 dB(W/Hz))for the transmission of FSS E/S 2) Modification to RR No. 5.502 to only extend minimum FSS E/S antenna limitation to the band it applies 3) Modification of RR No.5.501A or add new provision, and apply RR No.9.17A to protect existing SRS (DRS) systems (SRS feeder downlinks) with regard to FSS 4) Modification of Table 7b of RR App.7 to extend coordination trigger of FSS E/S with respect to RLS and RNS
<u>14.5-14.8 GHz</u>	1) unplanned primary FSS allocation is proposed on a global basis; 2) include coordination trigger in RR App.5 under RR No.9.7 between assignments not subject to RR AP 30A; 3) modification of Art.4 and 7 of App.30A to define the procedure for coordination of an unplanned FSS assignments vis-à-vis assignments in, or proposed modifications to, App.30A Plan/List; 4) revisions of Annexes 1 and 4 for triggering the coordination as in 3); 5) regarding the coordination of unplanned FSS with respect to MS, using current coordination procedures OR developing a new Resolution describing the procedures; 6) regarding the coordination of unplanned FSS with respect to DRS in the SRS, grandfathering method is proposed.
<u>14.8-15.05 GHz in Reg.2</u> and <u>14.8-15.1 GHz in Reg.3</u>	1) to protect existing SRS systems with regard to FSS through new and/or modified regulatory provisions 2) modification of Table 7b of RR App.7 to extend coordination trigger of FSS E/S with respect to RLS and RNS

**Same method applies to both regions, but only :
250 MHz in Region 2
and
300 MHz in Region 3**

Review the use of 5 091-5 150 MHz by FSS (Earth-to-space), limited to feeder links of the non-GSO MSS systems

Method to satisfy the agenda item: Only one draft Method is proposed

- 1. the use of the band 5 091-5 150 MHz by systems of the FSS providing Earth-to-space feeder links of non-GSO systems in the MSS be maintained as a primary allocation;**
- 2. each of the time limits on this allocation** given in RR No. 5.444A, i.e. after 1 January 2016 no new assignments shall be made and after 1 January 2018 the FSS will become secondary to the ARNS, **be suppressed;**
- 3. the text specifying that “use of the band 5 091-5 150 MHz by FSS feeder links shall be made in accordance with Resolution 114 (Rev.WRC-15)” be added to the footnote;**
- 4. coordination between FSS earth stations and ARNS ground stations is required under certain circumstances** to ensure that the ARNS is protected from harmful interference and that a fixed distance be used in determining the coordination area; and
- 5. flexibility for AM(R)S be improved while ensuring protection of the FSS**

Review the provisions relating to earth stations located on board vessels (ESVs)

5 draft Methods are proposed to satisfy the agenda item:

Method A: No change to the Radio Regulations

Any reduction in antenna size and reduction of distance between the vessels and shore would adversely impact the deployment of backbone terrestrial services.

Method B: Increasing off-shore protection distance in the C band

Based on the increasing number of vessels and the current maximum ESV e.i.r.p. density levels, the protection distance is increased to above 300 km in the C band.

Method C: Establishment of different protection distances for different maximum e.i.r.p. density levels, with shorter protection distances for e.i.r.p. density levels lower than those currently allowed by Resolution 902 (WRC-03)

- 1) Adequate protection of terrestrial services
- 2) Adoption of protection distances associated with maximum values of ESV e.i.r.p. spectral density towards the horizon when lower transmitting e.i.r.p. density levels (e.g. use of spread spectrum modulation) are or planned to be deployed
- 3) The effect of increased frequency of ESV passes need to be taken into account since the minimum ESV antenna diameter considered for the 6 GHz band nowadays is 1.2m instead of the 2.4m diameter provided in Resolution **902 (WRC-03)**

Method D: Establishment of different protection distances for different maximum e.i.r.p. density levels for the increasing ESVs passes in the C and Ku bands

- 1) The fundamental rules in Resolution **902 (WRC-03)** are still valid
- 2) According to protection afforded by Resolution **902 (WRC-03)**, different protection distances could be derived for ESVs transmitting lower e.i.r.p. density levels toward the horizon (e.g. use of spread spectrum modulation)

Method E: Review of the regulatory regime governing operation of ESVs

This Method proposes to review the regulatory regime governing the operation of ESVs to conform to the principles and objectives of the RR

Possible new allocations to FSS in 7150-7250 (s-E) & 8400-8500 (E-s) MHz

3 draft Methods are proposed to satisfy the agenda item

Method A

- 1) Make a primary **FSS allocation on a worldwide basis for these bands/directions, limited to GSO** FSS space stations
- 2) **Space station emissions** in the band **7 150-7 235 MHz shall comply with an e.i.r.p. spectral density mask**
- 3) **Tx earth stations** in the band **8 400-8 500 MHz** shall be **limited to specific**, i.e. operating at **fixed, known locations**, with **3.5 m minimum antenna diameter**
- 4) **Coordination under** RR No. **9.17**, No. **9.17A** (which is also applicable to sharing with stations of the EESS that may be allocated to this band at WRC-15 under agenda item 1.11), and **notification under** RR No. **11.2 shall apply**
- 5) RR Art. **21** (Tables **21-2**, **21-3** and **21-4**) and RR App.7 (Tables **7b**, **8c** and **9a**) are amended to include the bands 7 150-7 250 MHz or 8 400-8 500 MHz
- 6) The FSS shall not claim protection from the SRS and the SOS, nor constrain the use and development of SRS and SOS earth stations. RR No. **5.43A** does not apply
- 7) Operational measures between involved FSS and SRS missions need further considerations to protect some near-Earth operations of SRS (deep space)

Method B: Same as A, except 7), but FSS (s-E) allocation limited to 7190-7250 MHz

Method C: No change, i.e. no FSS allocation in 7 150-7 250 & 8 400-8 500 MHz bands