

## **European Space Agency (ESA)**

### **SFCG OBJECTIVES FOR WRC-15**

The Space Frequency Coordination Group (SFCG)<sup>1</sup> is an informal group dealing with frequency management issues relevant to the activity of the various space agencies.

The SFCG was created in 1980 and had regular meetings each year since then.

All the main space agencies in the world are represented at SFCG: ESA, NASA(US), JAXA(J), NOAA(US), Eumetsat, CNES(F), DLR(D), ASI(I), UKSA(UK), INTA(E), NLR(NL), SSC(S), RFSA(RUS), CSA(CAN), CAST(CHN), CMA (CHN), CNSA (CHN), ISRO(IN), NSPO(TWN), KARI(KOR), CSIRO(AUS), NASRDA(NIG), SANS(SAF), CONAE(ARG), INPE(BRA), EIAST (UAE), plus a number of international observers from United Nations organizations and other SFCG-related groups: ITU-R, WMO, CCSDS, CEOS, CGMS, Eumetnet, GRSS, IOAG, IUCAF.

The main SFCG targets are:

1. Provide an effective use and management of those radio frequency bands that are allocated for use by satellites operating in space exploration, meteorology, Earth exploration, manned space missions, satellite radionavigation. This is achieved by establishing technical recommendations applicable to all the missions by the member space agencies and by bilateral/multilateral frequency coordinations for new space mission under development.
2. Protect these frequency bands from interference by other spectrum users.
3. Follow and influence changes in the international regulations on frequency use that may affect the member agencies missions.

In relation to the 3<sup>rd</sup> point mentioned above, SFCG has developed a document containing a set of Objectives related to the WRC-15 Agenda Items relevant to the SFCG scope. These objectives have been agreed among all the SFCG member agencies and represent therefore a consolidated view of the space agencies on WRC-15.

This document is submitted to the InterRegional Workshop on WRC-15 for information to the delegates so that they can take it into account when developing national/regional positions for WRC-15.

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<sup>1</sup> More information on the SFCG can be found at <http://www.sfcgonline.org>

*OBJECTIVES OF THE  
SPACE FREQUENCY  
COORDINATION GROUP (SFCG)*



*FOR THE 2015  
WORLD RADIOCOMMUNICATION  
CONFERENCE*

*July 2014*



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WORLD RADIOCOMMUNICATION  
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## **OBJECTIVES OF THE SPACE FREQUENCY COORDINATION GROUP (SFCG) FOR THE 2015 WORLD RADIOCOMMUNICATION CONFERENCE**

### **Introduction**

These are the objectives of SFCG members concerning issues affecting space science services on the agenda of the World Radiocommunication Conference 2015 (WRC-15). The contents may be used by SFCG members to inform their Administrations, and to facilitate conference preparation and WRC consideration.

The presentation is organized to align with the Agenda for the WRC-15 as presented in Resolution 807 (WRC-12). Not all of the items in that Agenda are of interest to the SFCG and therefore only those specific agenda items, relating to SFCG issues, are discussed herein.

The SFCG is concerned with the effective use and management of those radio frequency bands that are allocated by the Radio Regulations of the ITU to the Space Research, Space Operations, Earth Exploration Satellite, and Meteorological Satellite services. SFCG promotes spectrum efficiency and recognizes the need for and the value of sharing frequency bands between more than one radio service, in cases where mutually agreed sharing and protection criteria have been established based upon the results of ITU-R studies.

However, in frequency bands allocated to the space science services, and where sharing has been shown to be infeasible, the SFCG holds the view that such sharing should not be implemented, and would support any review by Administrations that might lead to a reduction in the number of such infeasible sharing situations in the Table of Frequency Allocations contained in the ITU Radio Regulations (RR).

SFCG attaches a particular importance to the protection of frequency bands used by space-based passive sensors to provide vital ecological and environmental data that is unobtainable by any other means. Such passive sensors depend for their successful operation on frequency bands that are defined by the physical laws.

**Agenda Item 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)**;

Resolution **233 (WRC-12)** calls for the study of additional mobile broadband spectrum requirements including IMT and the study of potential candidate frequency bands. The Resolution also invites WRC-15 to take into consideration the results of these studies and take appropriate action.

The agenda item does not specify bands of study but studies will likely concentrate on bands below 6 GHz, in which there are a number of frequency bands of interest for SFCG. ITU-R WP 5D is currently considering whether to identify suitable frequency ranges above 6 GHz.

### *SFCG Objective*

SFCG supports the protection of existing space science service and GNSS allocations. No allocations of spectrum to support mobile broadband systems, IMT or RLAN, should be made in space science service bands unless acceptable sharing criteria and conditions are developed.

On the basis of the list of frequencies where studies have been called for in JTG 4-5-6-7, the main frequency bands of concern to SFCG member agencies are:

- the 410-420 MHz band, used for proximity and docking operations at the International Space Station. This band was identified by WP5D as suitable for IMT. However, no studies have been put forward supporting its identification for IMT or RLAN systems within the JTG.
- the 1400 – 1427 MHz band, used for EESS (passive) (e.g. Aquarius, SMOS, SMAP missions), whose adjacent bands 1375 – 1400 MHz and 1427 – 1452 MHz have been proposed for IMT identification. Considering current technical studies, SFCG is of the view that any decision made about identification of the bands 1375 – 1400 MHz and 1427 – 1452 MHz for broadband mobile will have to be associated with the inclusion of relevant mandatory unwanted emissions limits in the 1400 – 1427 MHz band in the RR;
- the 1695 – 1710 MHz band, used for meteorological satellite applications. This band is used by all meteorological-satellite systems with Earth stations operated by almost all National Meteorological and Hydrological Services (NMHS) and many other users. This band is essential for providing operational and time-critical meteorological information to the users around the world. For this reason SFCG is opposed to an allocation/identification of the frequency band 1695 – 1710 MHz for terrestrial mobile broadband applications including IMT except if such allocation/identification ensures the protection of MetSat Earth station operations in that band;
- the 3400 – 4200 MHz band, used for Galileo Data Distribution Network and the dissemination of meteorological data by systems like EUMETCast, CMACast and GEONETCast;

- the 5350 – 5470 MHz active remote sensing band, used for SARs (e.g. Radarsat, GMES Sentinel-1 satellites), and altimeters (e.g. GMES Sentinel-3 satellites, HY-2). On the basis of the technical studies, which show that RLANs cannot share the band 5350 – 5470 MHz with EESS (active) and that no credible (practical or effective) mitigation technique has been identified, SFCG opposes an allocation to the MS in this band for use by terrestrial mobile broadband applications.

SFCG does not support the consideration of bands above 6 425 MHz under this agenda item at WRC-15.

In addition, SFCG opposes any revisiting of the conditions set in RR No. **5.391** pertaining to the bands 2025 – 2110 MHz and 2200 – 2290 MHz used for space research, earth exploration-satellite and space operation services and therefore objects to any IMT identification in these bands under agenda item 1.1.

**Agenda Item 1.3** to review and revise Resolution **646 (Rev.WRC-12)** for broadband public protection and disaster relief (PPDR), in accordance with Resolution **648 (WRC-12)**; Resolution **648** calls for studies on broadband PPDR and the revision of Resolution **646**.

#### *SFCG Objective*

SFCG supports the protection of existing space science service allocations. No additional identification of spectrum to support PPDR should be made in space science service bands unless acceptable sharing criteria are developed. SFCG should monitor the evolution of the agenda item in order to avoid PPDR identification immediately above 406.1 MHz (noting the connection with AI 9.1.1).

**Agenda Item 1.5** to consider the use of frequency bands allocated to the fixed-satellite service not subject to Appendices **30**, **30A** and **30B** for the control and non-payload communications of unmanned aircraft systems (UAS) in non-segregated airspaces, in accordance with Resolution **153 (WRC-12)**;

Resolution **153 (WRC-12)** calls for possible regulatory actions to support the use of FSS frequency bands for the UAS control and non-payload communications (CNPC) links ensuring the safe operation of UAS CNPC links.

The potentially affected space science service bands are: 8025-8500 MHz EESS and SRS and 13.75-14 GHz SRS(s-s). Other frequency bands of direct interest to SFCG among those currently identified for studies by WP 5B in their PDNR ITU-R M.[UAS-FSS] are the srs bands 14-14.3 GHz and 14.4-14.47 GHz, and the EESS (passive) band 18.6-18.8 GHz.

#### *SFCG Objective*

SFCG supports the protection of existing space science service allocations while recognizing the practical requirement of UAS CNPC links, in particular for beyond line of sight operations (BLOS), in FSS bands. There is a secondary SRS allocation in the band 13.75-14 GHz (primary status with respect to FSS systems for some GSO

SRS networks for which API has been received prior to a certain date). No changes to the FSS allocation in the 13.75-14 GHz band should be made unless acceptable sharing criteria are developed with the SRS. Although it can be assumed that the focus will be more on FSS Ku and Ka bands, the SFCG also seeks to ensure that this item will not lead to authorising UAS in the FSS X-band allocations shared with EESS and METSAT. SFCG also supports the protection of secondary srs allocations in 14-14.3 GHz and 14.4-14.47 GHz bands. Finally, any use of FSS bands for UAS CNPC links in 18.6-18.8 GHz band must meet the provisions of RR Nos. **5.522A** and **5.522B**.

**Agenda Item 1.6.1** to consider possible additional primary allocations to the fixed-satellite service (Earth-to-space and space-to-Earth) of 250 MHz in the range between 10 GHz and 17 GHz in Region 1 and review the regulatory provisions on the current allocations to the fixed-satellite service within that range in accordance with Resolution **151 (WRC-12)**.

Resolution **151 (WRC-12)** calls for studies of possible bands for new primary allocations to the fixed-satellite service of 250 MHz in both directions in Region 1 within the bands 10-17 GHz, with particular focus on the frequency range that is contiguous (or near contiguous) to the existing fixed-satellite service allocations, while protecting the existing primary services in the band 10-17 GHz;

Resolution **151** excludes from consideration modification of Nos. **5.502** and **5.503** and Resolution **144 (Rev.WRC-07)**. This effectively ensures that the regulatory protection provided by these footnotes to SRS (s-s) in the 13.75-14 GHz band will remain unchanged by this agenda item. Potentially affected space science service bands are: 10.6-10.7 GHz EESS (passive) SRS (passive); 13.25-13.75 GHz EESS (active) and SRS (active); 13.4-13.75 GHz srs; 14.5-15.35 GHz srs; 15.2-15.35 GHz eess (passive) and srs (passive); 15.35-15.4 GHz EESS (passive) and SRS (passive); 16.6-17.1 GHz srs (deep space) (Earth-to-space). Resolution **151** also precludes the consideration of the Appendix 30B band 12.75-13.25 GHz thereby ensuring the protection of the secondary srs (deep space) (space-to-Earth) allocation in this band.

### *SFCG Objective*

SFCG supports the protection of existing space science service allocations. No additional allocation of spectrum to support FSS (E-s or s-E) should be made in space science service bands unless acceptable sharing conditions are agreed. There is particular concern with the possible allocation of FSS (Earth-to-space) in the 13.25-13.75 GHz band allocated to EESS (active). This band is used for active remote sensing (altimeters and scatterometers) by missions such as Cryosat, Jason-2, -3, Jason-CS, Sentinel-3, and HY-2. Prior studies have shown incompatibility between these services. Therefore, SFCG supports no new allocation to FSS (E-s) in the band 13.25-13.75 GHz.

Other services to be protected are the EESS (passive) and SRS (passive) in the band 10.6-10.7 GHz, eess (passive) and srs (passive) in the band 15.2-15.35 GHz, the srs in the bands 13.4-13.75 GHz and 14.5-15.35 GHz, and the standard frequency and time signal-satellite (Earth-to-space) service in the band 13.4-13.75 GHz.

The band 10.6-10.7 GHz is allocated to EESS (passive). RR No. **5.340** prohibits all emissions in the band 10.68-10.7 GHz. Therefore, SFCG supports no new allocation to FSS (s-E) or FSS (E-s) in the band 10.6-10.7 GHz.

The frequency band 13.4-13.75 GHz is used by DRS systems for forward inter-orbit links and for return feeder links. The frequency band 14.5-15.35 GHz is used by DRS systems for return inter-orbit links and for forward feeder links and also for wideband SRS downlinks to transmit high rate scientific data from LEO, GSO or HEO SRS satellites. The feasibility of sharing between these SRS links and FSS links requires further study using protection criteria of ITU-R Recommendations SA.609 and SA.1155 and technical characteristics of ITU-R Recommendations SA.1414 and SA.1626. In case an allocation for FSS would be adopted in these bands, the SRS forward and return inter-orbit links and down links notified before WRC-15 must receive co-equal status with FSS.

In addition, the band 13.4-13.75 GHz will be used by the ACES system under the standard frequency and time signal-satellite (Earth-to-space) service and its future operation needs to be ensured.

**Agenda Item 1.6.2** to consider possible additional primary allocations to the fixed-satellite service (Earth-to-space) of 250 MHz in Region 2 and 300 MHz in Region 3 within the range 13-17 GHz; and review the regulatory provisions on the current allocations to the fixed-satellite service within this range, taking into account the results of ITU-R studies, in accordance with Resolution **152 (WRC-12)**;

Resolution **152 (WRC-12)** calls for studies of possible bands for a new primary allocation to the fixed-satellite service in the Earth-to-space direction of 250 MHz in Region 2 and 300 MHz in Region 3 within the bands 13-17 GHz.

Resolution **152** excludes from consideration modification of RR Nos. **5.502** and **5.503** and Resolution **144 (Rev.WRC-07)**. This effectively ensures that the regulatory protection provided by these footnotes to SRS (s-s) in the 13.75-14 GHz band will remain unchanged by this agenda item. Also excluded from consideration is the 13-13.25 GHz band (RR Appendix 30B). Potentially affected space science service bands are: 13.25-13.75 GHz EESS (active) and SRS (active); 13.4-13.75 GHz srs; 14.5-15.35 GHz srs; 13.25-13.75 GHz EESS (active) and SRS (active); 15.35-15.4 GHz EESS (passive) and SRS (passive); 16.6-17.1 GHz srs (deep space) (Earth-to-space).

### ***SFCG Objective***

SFCG supports the protection of existing space science service allocations. No additional allocation of spectrum to support FSS (Earth-to-space) should be made in space science service bands unless acceptable sharing conditions are agreed. There is particular concern with the possible allocation of FSS (Earth-to-space) in the 13.25-13.75 GHz band allocated to EESS (active). This band is used for active remote sensing (altimeters and scatterometers) by missions such as Cryosat, Jason-2, -3, Jason-CS, Sentinel-3, and HY-2. Prior studies have shown incompatibility between



these services. Therefore, SFCG supports no new allocation to FSS (Earth-to-space) in the band 13.25-13.75 GHz.

Other services to be protected are the srs in the bands 13.4-13.75 GHz and 14.5-15.35 GHz and the eess (passive) and srs (passive) in the band 15.2-15.35 GHz.

The frequency band 13.4-13.75 GHz is used by DRS systems for forward inter-orbit links and for return feeder links. The frequency band 14.5-15.35 GHz is used by DRS systems for return inter-orbit links and for forward feeder links and also for wideband SRS downlinks to transmit high rate scientific data from LEO, GSO or HEO SRS satellites. The feasibility of sharing between this SRS links and FSS links requires further study using protection criteria of ITU-R Recommendations SA.609 and SA.1155 and technical characteristics of ITU-R Recommendations SA.1414 and SA.1626. In case an allocation to FSS is adopted in these bands, the SRS forward and return inter-orbit links and down links notified before WRC-15 must receive co-equal status with FSS.

In addition, the band 13.4-13.75 GHz will be used by the ACES system under the standard frequency and time signal-satellite (Earth-to-space) service and its future operation needs to be ensured.

**Agenda Item 1.8** to review the provisions relating to earth stations located on board vessels (ESVs), based on studies conducted in accordance with Resolution **909 (WRC-12)**;

Resolution **909 (WRC-12)** calls for review of the provisions relating to ESVs which operate in the FSS in the uplink bands 5 925-6 425 MHz and 14-14.5 GHz and consider possible modifications to Resolution **902 (WRC-03)**.

The potentially affected space science service band is: 14-14.3 GHz srs.

### *SFCG Objective*

SFCG supports the protection of existing space science service allocations. No revision to the provisions relating to ESVs should be made in 14-14.5 GHz band unless acceptable sharing criteria are developed.

**Agenda Item 1.9.1** to consider, in accordance with Resolution **758 (WRC-12)** possible new allocations to the fixed-satellite service in the frequency bands 7 150-7 250 MHz (space-to-Earth) and 8 400-8 500 MHz (Earth-to-space), subject to appropriate sharing conditions;

Resolution **758** calls for technical and regulatory studies on the possible new allocations to the FSS in the frequency bands 7 150-7 250 MHz (space-to-Earth) and 8 400-8 500 MHz (Earth-to-space) in order to ensure compatibility with existing services, with a view to extending the current worldwide allocation to the FSS in the bands 7 250-7 750 MHz (space-to-Earth) and 7 900-8 400 MHz (Earth-to-space). Resolution **758** excludes small VSAT-like usage in the possible new allocations and specifies that FSS operations be from fixed, known locations. Potentially affected

space science service bands are: 7100-7155 MHz SOS, 7145-7190 MHz SRS (deep space) (Earth-to-space); 7190-7235 MHz SRS (Earth-to-space) and SOS; 8400-8450 MHz SRS (deep space) (space-to-Earth); 8450-8500 MHz SRS (space-to-Earth). It is to be noted that under Agenda Item 1.11, parts of the 7150-7250 MHz band are being considered for the addition of an EESS (Earth-to-space) allocation.

### *SFCG Objective*

SFCG supports the protection of the science services in all frequency bands as indicated above. No new allocations to the FSS should be made in these frequency bands unless acceptable solutions are found to the following issues:

- Large coordination zones to be imposed around current and future SRS earth stations;
- Mechanisms to ensure full protection of SRS (deep space and near Earth) spacecraft as well as SOS links.

**Agenda Item 1.9.2** to consider, in accordance with Resolution **758 (WRC-12)** the possibility of allocating the bands 7 375-7 750 MHz and 8 025-8 400 MHz to the maritime-mobile satellite service and additional regulatory measures, depending on the results of appropriate studies;

Resolution **758** calls for technical and regulatory studies on the possible new allocations to the maritime mobile-satellite service (MMSS) in the frequency bands 7375-7750 MHz (space-to-Earth) and 8025-8400 MHz (Earth-to-space) while ensuring compatibility with existing services,

The potentially affected space science service bands are: 7450-7550 MHz MetSat (s-E, GSO); 8175-8215 MHz MetSat (E-s); and 8025-8400 MHz EESS (s-E) and 8400-8450 MHz SRS (deep space) (space-to-Earth).

### *SFCG Objective*

SFCG supports the protection of existing METSAT and EESS allocations as well as the protection of SRS (s-E) (deep space) allocation from adjacent band interference. No new allocations to the MMSS should be made in the frequency band 8025-8400 MHz. It is noted that the International Maritime Organisation has no interest in this allocation. Particular concern is noted with regard to potential interference to EESS (s-E) operations in 8025-8400 MHz at high latitudes from ships operating in proximity, and out-of-band interference to SRS (deep space) (s-E) reception in the 8400-8450 MHz band. Large exclusion zones would be needed to avoid interference to existing and future EESS and SRS earth stations from potentially large numbers of ships. Many of the more than 100 existing EESS and SRS earth stations are located near coastal areas (e.g., Svalbard, McMurdo, Maspalomas, Lannion, Wallops) and could be seriously affected by emissions from vessels navigating in the area up to distances of hundreds of km from the coastline. SFCG considers that the enforcement of these large exclusion zones would not be feasible in practice, leading to interference that will be very difficult to track due to the mobile nature of the systems. It is also to be noted that any new EESS/SRS Earth station would require updating the database of the exclusion zones.

Therefore SFCG is opposed to this proposed allocation to MMSS in the frequency band 8025-8400 MHz.

**Agenda Item 1.10** to consider spectrum requirements and possible additional spectrum allocations for the mobile-satellite service in the Earth-to-space and space-to-Earth directions, including the satellite component for broadband applications, including International Mobile Telecommunications (IMT), within the frequency range from 22 GHz to 26 GHz, in accordance with Resolution **234 (WRC-12)**;

Resolution **234 (WRC-12)** calls for sharing and compatibility studies towards additional allocations to the mobile-satellite service in the Earth-to-space and space-to-Earth directions, within portions of the bands between 22 GHz and 26 GHz, while ensuring protection of existing services within these bands as well as taking into account No. **5.340** and No. **5.149**.

Resolution **234 (WRC-12)** also recognizes that unwanted emissions in the band 23.6-24 GHz will need to be limited to ensure protection of systems of the EESS (passive), SRS (passive) and radio astronomy services.

#### *SFCG Objective*

SFCG supports the protection of all the space science bands in the range 22-26 GHz considered under this agenda item. No new allocations to the MSS should be made unless acceptable sharing criteria with the affected space science service are developed.

The main frequency bands at risk for SFCG member agencies are:

- 1) The SRS Earth-to-space allocation in the band 22.55 – 23.15 GHz
- 2) The Inter-satellite band 22.55 – 23.55 GHz and the first 750 MHz of the Inter-satellite band 25.25 – 27.5 GHz.
- 3) The allocations to EESS (passive) in the bands 23.6-24 GHz (purely passive, RR No. **5.340**, but to be protected against unwanted emissions taking into account interference apportionment and the levels contained in ITU Resolution **750 (rev. WRC-12)** as well as the band 22.21 – 22.5 GHz.
- 4) The first 500 MHz of the EESS/SRS space-to-Earth band 25.5 – 27.0 GHz

*Note* – The lack of clarity on the technical parameters of these new MSS systems needed for appropriate compatibility studies with science services is another element of concern for SFCG.

**Agenda Item 1.11** to consider a primary allocation for the Earth exploration-satellite service (Earth-to-space) in the 7-8 GHz range, in accordance with Resolution **650 (WRC-12)**;

Resolution **650 (WRC-12)** calls for study of the spectrum requirements and compatibility studies in the 7-8 GHz range for EESS (Earth-to-space) telecommand

operations in order to complement telemetry operations of EESS (space-to-Earth) in the 8 025-8 400 MHz band.

Resolution **650** indicates that priority is given to the band 7 145-7 235 MHz. Potentially affected space science service bands are: 7145-7190 MHz SRS (deep space) (E-s); 7190-7235 MHz SRS (E-s). Also, noting that under Agenda Item 1.9.1 possible new allocations to the FSS in the frequency band 7 150-7 250 MHz (space-to-Earth) are being considered.

### *SFCG Objective*

SFCG supports a primary allocation to EESS (E-s) in the band 7190-7250 MHz as provided for in Method A of the Draft CPM Report. This would satisfy the EESS spectrum requirements identified.

The frequency range 7235-7250 MHz would be used for those cases of EESS spacecraft links presenting a difficult sharing scenario with SRS spacecraft and SOS links in the frequency range 7190-7235 MHz.

SFCG does not support an allocation to EESS (E-to-s) in the 7145-7190 MHz band due to incompatibility with SRS (deep space).

**Agenda Item 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, in accordance with Resolution **651 (WRC-12)**;

Resolution **651 (WRC-12)** calls for a possible extension of the current worldwide allocation to the EESS (active) in the frequency band 9 300-9 900 MHz by up to 600 MHz on a primary and/or secondary basis, as appropriate, within the frequency range 8 700-9 300 MHz and/or 9 900-10 500 MHz while ensuring protection of existing services and taking due account of the safety services allocated in the frequency band 9 000 to 9 300 MHz. This agenda item, which was also supported by SFCG, intends to enable higher image resolutions of less than 30 cm from next generation X-band SAR sensors.

Potentially affected space science service bands are: 8400-8450 MHz SRS (deep space) (s-E), 8 450-8 500 MHz SRS (s-E), and 10 600-10 700 MHz EESS (passive) and SRS (passive), all might be affected through potential unwanted emissions (OOBE), also largely depending on the WRC-15 decision, where extended frequency spectrum would eventually be allocated.

### *SFCG Objective*

SFCG supports an extension of the current worldwide allocation to the Earth exploration-satellite (active) service in the frequency band 9 300-9 900 MHz by 600 MHz. Compatibility with SRS (space-to-Earth) links in the 8 400-8 500 MHz band and the EESS (passive) in the 10.6-10.7 GHz band will have to be ensured, in accordance with the appropriate protection criteria, taking into account any available mitigation techniques

that would reduce the level of unwanted emissions in those two bands and the need for operational coordination with SRS (deep space) operators.

**Agenda Item 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 Resolution **652 (WRC-12)**.

Resolution **652** calls for sharing studies between SRS (space-to-space) systems communicating in proximity with orbiting manned space vehicles and systems operating in the fixed and mobile (except aeronautical mobile) services in the band 410-420 MHz; and for WRC-15 to consider modifying No. **5.268** to allow the removal or relaxation of the 5 km distance limitation without modifying the current pfd limits and to clarify more general use of the 410-420 MHz band for SRS (space-to-space) systems beyond extra-vehicular activities.

#### *SFCG Objective*

SFCG supports removing the 5 km distance limitation and explicitly allowing space research service (space-to-space) use for proximity operations by space vehicles communicating with an orbiting manned space vehicle.

**Agenda Item 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, in accordance with Resolution **653 (WRC-12)** which calls for studies on the feasibility of achieving a continuous reference time-scale for dissemination by radiocommunication systems;

Resolution **653** recognizes that that a change in the reference time-scale may have operational and therefore economic consequences. As a result, all space science service operations are potentially impacted.

#### *SFCG Objective*

SFCG is of the opinion that space science satellite operations and launches would benefit from a continuous time scale.

**Agenda Item 1.17** to consider possible spectrum requirements and regulatory actions, including appropriate aeronautical allocations, to support wireless avionics intra-communications (WAIC), in accordance with Resolution **423 (WRC-12)**;

Resolution **423** calls for studies of possible regulatory actions, including appropriate aeronautical allocations, to support the implementation of WAIC systems. Frequency bands within existing worldwide aeronautical mobile service, aeronautical mobile (R) service and aeronautical radionavigation service allocations are to be considered; however, additional frequency bands above 15.7 GHz for aeronautical services are to be considered if spectrum requirements cannot be met in those existing frequency band allocations.

Potentially affected space science service bands coinciding with “existing worldwide aeronautical mobile service, aeronautical mobile (R) service and aeronautical

radionavigation service allocations” below 15.7 GHz are: 4200-4400 MHz eess (passive), 5350-5460 MHz EESS (active) and 13.25-13.4 GHz EESS (active) and SRS (active) (both subject to RR No. **5.498A**).

### *SFCG Objective*

SFCG supports the protection of existing space science service allocations. No identification of bands for WAIC systems operations should be made in bands allocated to science services unless acceptable sharing criteria with the affected space science service are developed. Given that the WAIC proponents are seeking safety service allocations for WAIC operations, studies also need to verify that the proposed WAIC systems would not receive harmful interference from the existing space science services operating with their current technical and operational parameters.

**Agenda Item 1.18** to consider a primary allocation to the radiolocation service for automotive applications in the 77.5-78.0 GHz frequency band in accordance with Resolution **654 (WRC-12)**;

Resolution **654** calls sharing studies and regulatory solutions to consider a primary allocation to the radiolocation service in the band 77.5-78 GHz, and also compatibility studies in the band 77.5-78 GHz with services operating in the adjacent bands 76-77.5 GHz and 78-81 GHz;

Potentially affected space science service bands are: 77.5-78 GHz srs (s-E); 76-77.5 GHz srs (s-E); 78-79 GHz srs (s-E); and, 79-81 GHz srs (s-E).

### *SFCG Objective*

SFCG supports the protection of existing space science service allocations. SFCG further supports a radiolocation allocation in 77.5-78 GHz for automotive applications as a means of removing such applications from the 23.6-24 GHz band. Every effort should be made to restrict the use of the potential radiolocation allocation to automotive radars to avoid application of these radars on helicopters, since this would potentially affect earth stations of SRS. Therefore SFCG supports Method A of the Draft CPM Report.

**Agenda Item 7** to consider possible changes, and other options, in response to Resolution **86 (Rev. Marrakesh, 2002)** of the Plenipotentiary Conference, an advance publication, coordination, notification and recording procedures for frequency assignments pertaining to satellite networks, in accordance with Resolution **86 (Rev. WRC-07)** to facilitate rational, efficient, and economical use of radio frequencies and any associated orbits, including the geostationary-satellite orbit;

This standing agenda item to the WRCs deals with any possible changes to the Radio Regulations affecting the advance publication, coordination, notification and recording of satellite networks.

## *SFCG Objective*

SFCG supports possible changes to the Radio Regulations to improve the handling of the advance publication, coordination, notification and recording procedures for satellite networks. SFCG has identified five issues of potential interest to space science services.

1. Should WRC-15 decide to address satellite filing procedures to facilitate the unique mission lifecycle of nanosatellites or picosatellites, SFCG believes any changes to satellite filing procedures to facilitate the unique mission lifecycle of nanosatellites or picosatellites should be in alignment with studies conducted in Working Party 7B and be carefully developed to ensure they apply exclusively to nanosatellites or picosatellites.
2. SFCG supports a clarification as to how the BR would address non-compliance with the requirement to inform the Radiocommunication Bureau within 6 months that use of frequency assignments have been suspended (as required under RR No. **11.49**). WRC-12 had modified this provision but left it unclear as to the consequence of not complying with the modified provision.
3. SFCG does not support regulatory changes requiring coordination under RR Section **II** of Article **9** for non-geostationary satellites communicating to geostationary satellites via inter-satellite links (data relay links).
4. SFCG will monitor Draft CPM text being considered that would either: a) suppress the required Advance Publication Information submissions for satellite networks that are subject to coordination provisions in the Radio Regulation; or, b) eliminate the six months required between receipt of API and coordination submissions. While such modifications are intended primarily to address the sometimes abused use of advantages stemming from API filings for commercial GSO satellite networks, this could be applicable to some GSO space services systems. In general, this would not be applicable to most NGSO space science systems.
5. SFCG will monitor Special Committee consideration of draft CPM text that suggests RR provisions that would maintain the bringing into use status of assignments of a satellite that failed on orbit during the BIU period specified in RR No. **11.44B**.

**Agenda Item 9.1.1** Protection of the systems operating in the mobile-satellite service in the band 406-406.1 MHz (under Res. **205 (Rev. WRC-12)**)

Resolution **205** calls for studies with a view to ensuring the adequate protection of MSS systems in the frequency band 406-406.1 MHz from any emissions that could cause harmful interference taking into account the current and future deployment of services in adjacent bands as noted in *considering f*);

The revised Resolution **205** resolves to conduct, and complete in time for WRC-15, the appropriate regulatory, technical and operational studies with a view to ensuring

the adequate protection of MSS systems in the frequency band 406-406.1 MHz from any emissions that could cause harmful interference (see No. **5.267**), Cospas-Sarsat space segment providers have developed protection criteria for the Cospas-Sarsat search and rescue instruments and local user terminals in the 406.0-406.1 MHz band in order to protect them against broadband out-of-band emissions and against narrow-band spurious emissions. These protection criteria have been recognized at the ITU level through Recommendation ITU-R M.1478-1. However, these protection criteria do not provide protection against emissions in adjacent bands which could hinder the Cospas-Sarsat system's ability to detect and/or relay signal from beacons.

Cospas-Sarsat is developing the relevant protection criteria for submission to the ITU and translation into an ITU-R recommendation.

### *SFCG Objective*

In order to ensure adequate protection of MSS systems in the frequency band 406-406.1 MHz and to detect and successfully process 406 MHz distress signals, SFCG supports a revision of Resolution **205 (Rev WRC-12)** containing appropriate mitigation measures, such as establishment of a guard band above 406.1 MHz concerning new frequency assignments to mobile networks.

**Agenda Item 9.1.5** “Consideration of technical and regulatory actions in order to support existing and future operation of fixed-satellite service earth stations within the band 3 400-4 200 MHz, as an aid to the safe operation of aircraft and reliable distribution of meteorological information in some countries in Region 1 (Resolution 154 (WRC-12))”

### *SFCG Objective*

SFCG supports technical and regulatory actions to protect the FSS operations in the band 3400-4200 MHz for the dissemination of meteorological data.

**Agenda Item 9.1.8** Regulatory aspects for nano- and pico-satellites (under Res.757 (WRC-12))

Resolution **757 (WRC-12)** instructs the Director of the Radiocommunication Bureau to report to WRC-15 on the results of the studies which will take place in Working Party 7B under Question ITU-R 254/7.

### *SFCG Objective*

SFCG supports contributions to studies under Question ITU-R 254/7.

SFCG favors the study of this issue, since it recognizes that a growing number of picosatellites/nanosatellites are under development in the world. At present many of these satellites operate in frequency bands allocated to the amateur-satellite service. Now there is an increasing demand for these satellites to operate in other satellite services. Many of these satellites are launched for scientific, experimental or educational purposes, sometimes in the form of constellations and there is a growing



interest for commercial non-scientific applications. SFCG supports that the frequency bands used should align with the applications being supported. An investigation on how this growing number of satellites can be supported is needed.

Given the complexity in obtaining a common definition of which types of satellites should be classified under the category nanosatellites and picosatellites and because these definitions tend to relate to elements that are not relevant from a frequency management perspective (size, mass, cost), SFCG supports further consideration of modifications to the RR, if needed, to facilitate the development of nanosatellites and picosatellites, taking into account the comparatively short development time and the potential lack of advance knowledge of certain operational parameters.

Any changes to the RR in relation to this agenda item should be carefully developed to ensure protection of all satellite missions. SFCG is of the opinion that any satellite, including nanosatellites and picosatellites, will have to be registered with the ITU and must adhere to the ITU-R Radio Regulations.

**Agenda Item 10** “to recommend to the Council items for inclusion in the agenda for the next WRC, and to give its views on the preliminary agenda for the subsequent conference and on possible agenda items for future conferences, in accordance with Article 7 of the Convention”

#### *General Principles:*

It is very important to ensure that before any new agenda item is agreed at WRC-15, the following elements are already available:

1. Clear demonstration and quantification of the spectrum requirements.
2. Technical and operational parameters of the new systems for which modification of the RR is proposed.
3. Identification of the exact bands targeted for regulatory changes.
4. Preliminary studies on the sharing feasibility in these bands.

SFCG is of the view that adherence to these principles should be made conditional for adoption of any new WRC agenda item.

(NOTE - Adherence to these principles would avoid the problems encountered with agenda items like WRC-15 AI 1.1 and 1.10)

SFCG supports the inclusion of the following items on the WRC-18 agenda:

***Agenda Item X.XI*** to consider the upgrade of the secondary allocation to the meteorological satellite (space-to-Earth) service in the frequency band 460 - 470 MHz to a primary status while ensuring the protection of the existing primary services in this frequency band and review the provisions of RR No. 5.289.

SFCG supports this agenda item in view of the improved protection of the Data Collection Systems using this band on several meteorological satellites.

*Agenda Item X.X2 to consider a possible allocation to the EESS (active) for radar sounders in the range of 40-50 MHz.*

SFCG supports this agenda item for remote measurements of the Earth's subsurface in order to locate water/ice/deposits using active spaceborne sensors. SFCG plans to carry out preliminary sharing studies with incumbent services in this frequency range.

*Agenda Item X.X3 to consider necessary coordination distances to protect space research service earth stations from aeronautical mobile service interference in the 2200-2290 MHz band.*

SFCG supports amending Table 10 (Annex 7) in Appendix 7 of the Radio Regulations to adjust the predetermined coordination distance between mobile (aircraft) stations and space research earth stations in the 2 200-2 290 MHz band in order to ensure proper protection of the SRS Earth stations.

*Agenda Item X.X4 to review and modify the definition of space research service (SRS) in No. 1.55 of the Radio Regulations to clarify that SRS spacecraft can operate in the region near the Earth (less than 2 million kilometers) or in the deep space region. Also review and amend as required RR Nos. 5.460 and 5.465.*

SFCG supports amending the definition of space research service (SRS) in RR No. 1.55 to clarify that SRS spacecraft operate in the region near the Earth or in the deep space region and that a spacecraft intended to operate in deep space also has to operate in the region near the Earth during launch and early orbit phases, Earth flybys, or while returning to Earth. In addition, modify footnotes RR Nos. 5.460 and 5.465 to remove the ambiguity that the term "deep space" in those footnotes refers to deep-space spacecraft and not a region in space.

## **Draft Agenda WRC-18<sup>1</sup>**

**Agenda Item 2.2** to consider the appropriate regulatory procedures for notifying satellite networks needed to facilitate the deployment and operation of nanosatellites and picosatellites, in accordance with Resolution **757 (WRC-12)**;

Resolution **757 (WRC-12)** invites the ITU-R to examine the procedures for notifying space networks and consider possible modifications to enable the deployment and operation of nanosatellites and picosatellites, taking into account the short development time, short mission time and unique orbital characteristics. It also invites WRC-18 to consider whether modifications to the regulatory procedures for notifying satellite networks are needed to facilitate the deployment and operation of nanosatellites and picosatellites, and to take the appropriate actions. The results of studies are to be included in the Report of the Director of the Radiocommunication Bureau to WRC-15.

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<sup>1</sup> From Resolution **808 (WRC-12)** Preliminary agenda for the 2018 World Radiocommunication Conference

### *SFCG Objective*

The SFCG objective will be developed based upon the results of discussions under WRC-15 Agenda item 9.1.8. SFCG supports further consideration of modifications to the RR, if needed, to facilitate the development of nanosatellites and picosatellites, taking into account the comparatively short development time and the potential lack of advance knowledge of certain operational parameters. It may be possible to address this issue under the standing WRC Agenda item 7.

It would be beneficial to modify Study Question ITU-R 254/7 to include the following items and to complete the work prior to WRC-18:

- study the growth in numbers of nanosatellites and picosatellites;
- study and propose ways to accommodate the growth in numbers of nanosatellites and picosatellites launched within the existing regulatory framework;
- study spectrum sharing techniques for nanosatellites and picosatellites among themselves and with other radio systems.