



SFCG Successes at WRC-15

Summary

Overall, the results of WRC-15 can be considered largely successful for Space Frequency Coordination Group (SFCG) members. SFCG members were instrumental in reaching successful conclusions on many WRC agenda items of great interest to the SFCG. In many cases, SFCG members acted as spokespersons for their own administrations or Regional Groups thereby having a very direct and large impact on the deliberations at the Conference on key agenda items for the SFCG.

Based on the results of the 2015 World Radiocommunication Conference (WRC-15) held in Geneva, Switzerland, from 2-27 November 2015, under the auspices of the International Telecommunication Union (ITU), the world science community has *inter alia*:

- Gained a new primary allocation to the Earth exploration-satellite service in the band 7 190-7 250 MHz band,
- Secured the ability to obtain greater resolution data products with an expanded Earth exploration-satellite (active) service allocation across the band 9 200-10 400 MHz,
- Facilitated the ability of vehicles to dock and undock from the International Space Station by eliminating distance and use restrictions contained in RR No. **5.268** to the existing space research service (space-to-space) allocation in the 410-420 MHz band,
- Clarified appropriate near Earth uses of allocations with “deep space” designations, and
- Strengthened the protection and recognition of emergency position-indicating radiobeacons (EPIRBS) using the mobile satellite service allocation the 406-406.1 MHz band.

The requirements and the technical foundations upon which the new allocations and protections were based had been established in the technical groups of the ITU-R during the 2012-2015 Study Period since the previous Conference held in Geneva in 2012. The space agencies of the world have also worked diligently to refine the technical and operational requirements within the Space Frequency Coordination Group (SFCG). The SFCG members worked within their own countries and the Regional Groups within the ITU-R process to make known the requirements of the space science community and their importance to mankind.

The following sections provide a more detailed look at the SFCG objectives, results and an evaluation of those results on an agenda item-by-agenda item basis.

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)**;

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.

SFCG does not support consideration of any frequency band that is not included in the list of potential candidate bands as identified in section 1/1.1/4.2 of the CPM report. Out of that list the bands of concern for SFCG are: 410-420 MHz, 1 400-1 427 MHz, 1 695-1 710 MHz, 2 025-2 110 MHz, 2 200-2 290MHz, 3 400-4 200 MHz, and 5 350-5 470 MHz

Result

The Conference did not identify the bands 410-420 MHz, 1 695-1 710 MHz, 2 025-2 110 MHz, 2 200-2 290 MHz, or 3 700-4 200 MHz for IMT.

The Conference adopted a worldwide identification for IMT in 1 427-1 452 MHz but with modifications to Resolution **750 (WRC-15)** calling for mandatory OOB limits on IMT base station and mobile station operations into the 1 400-1 427 MHz band. These mandatory limits are more restrictive than the previous recommended limits on mobile systems in this band that were set at WRC-07.

The Conference adopted a number of provisions in all three Regions identifying IMT in the band 3 400-3 600 MHz. The band 3 600-3 700 MHz was identified for IMT in four Region 2 countries.

The Conference did not identify the band or 5 350-5 470 MHz for IMT. However, WRC-19 Agenda Item 1.16 will reopen the 5 350-5 470 MHz issue with respect to RLANs.

Evaluation

SFCG objectives were generally met. In particular the SFCG was particularly successful in maintaining the existing sharing conditions within its “no change” bands. The introduction of mandatory limits in Resolution **750 (WRC-15)** to protect the 1 400-1 427 MHz band was a major accomplishment with regard to ensuring the long term protection of vital spaceborne passive sensor measurements. However, the issue of identifying the band 5 350-5 470 MHz for RLANs will continue to be addressed in the WRC-19 study cycle in the framework of a new agenda item with a larger scope (5 150 – 5 925 MHz).

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 opposes PPDR identification in the frequency band 401-403 MHz and immediately below 406 MHz and above 406.1 MHz (noting the connection with AI 9.1.1).

Result

The Conference adopted a revision of Resolution **646 (Rev. WRC-15)** which included a globally harmonized frequency range 694-894 MHz as well as several regionally harmonized ranges. Additionally, the Conference added provisions to Res. **646 (Rev. WRC-15)** to accommodate administrations' emergent PPDR needs by identifying an ITU-R Recommendation (ITU-R M.2015) in which to include spectrum allocated by each administration. This will preclude the need for future WRC actions to update Res. **646 (Rev. WRC-15)**.

Evaluation

SFCG objectives for WRC-15 were generally met. However, identification of spectrum directly above 406.1 MHz in Region 3 continues to exist.

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)**;

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**.

Result

This Agenda Item required a great deal of discussion. In order to reach agreement, much compromise was required by the Conference. The Results may be summarized as follows:

1. Only the frequency bands 10.95-11.2 GHz (space-to-Earth), 11.45-11.7 GHz (space-to-Earth), 11.7-12.2 GHz (space-to-Earth) in Region 2, 12.2-12.5 GHz (space-to-Earth) in Region 3, 12.5-12.75 GHz (space-to-Earth) in Regions 1 and 3 and 19.7-20.2 GHz (space-to-Earth), and in the frequency bands 14-14.47 GHz (Earth-to-space) and 29.5-30.0 GHz (Earth-to-space) were provisionally approved for use by UAS CNPC.
2. Completion of standards and recommended practices (SARPS) by ICAO is required before such use can be implemented. ICAO does not expect this to be accomplished before 2020.
3. Therefore a final review and revision of the resolution is required by WRC-2023.
4. Despite an agreement on acceptable pfd limits, the resolution actually defaults to an older document (ITU-R M.1643) to set the pfd limits in 14.0-14.47 GHz, declares these pfd limits to be provisional and requires them to be reviewed and revised at WRC-19, and then further backtracks to refer to them as only an “example”.
5. With the reduction of spectrum approval in Ka Band from 27.5-30.0 GHz down to 29.5-30.0 GHz, a pfd limit in that band is no longer required as there are not primary terrestrial services in 29.5-30.0 GHz.
6. A number of resolves were required in order to satisfy issues involving satellite coordination, interference, and protection issues.
7. The BR Director is instructed “to define a new class of station in order to be able to process satellite network filings submitted by administrations for Earth stations providing UA CNPC links”, this removed a main stumbling block of one administration which could have been removed three years ago if there had been a will to do so.
8. There was no identification of the EESS or MetSat X-band, the 13.75-14 GHz or the 18.6-18.8 GHz band for UAS CNPC.

Evaluation

The results, shown above, provide a way forward for those wishing to continue the process of developing UAS BLOS CNPC, however much remaining work as well as potential points for future opposition was built into this resolution. SFCG objectives were generally met with the most notable exception of the provisional approval of the band 14-14.47 GHz for use by UAS CNPC. It should further be noted that as the results, shown in 2, 3, and 4 above, will require additional discussion at both WRC-19 and WRC-23, this subject will continue to be revisited.

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)**.

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 that is allocated to EESS (active). This band is used for active remote sensing (altimeters, precipitations radars, scatterometers) by missions such as Cryosat, Jason-2, -3, Jason-CS, Sentinel-3, and HY-2.

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.

Studies have shown that EESS (active) systems would be compatible with FSS (s-E) so SFCG could support a Region 1 allocation for FSS (s-E) within the 13.4-13.75 GHz frequency range if:

- a provision is included in the RR such that FSS (s-E) shall not claim protection from EESS (active);
- relevant pfd limitations are introduced in RR Article **21**;
- RR Article **22-2** does not apply.

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. An FSS (E-s) allocation in the frequency range 14.5-14.8 GHz could be accommodated if the current secondary srs allocation was given equal status with the FSS (E-s) such that RR Article **9** coordination between FSS and SRS GSO data relay satellites applies. SFCG opposes any grandfathering of the co-equal status between FSS and SRS as given in the example Regulatory text for the allocation Methods included in the CPM Report.

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. A suitable footnote is needed to ensure no undue limitations to the deployment of these very low power systems.

Result

For Region 1, the Conference decided on an FSS (s-E) allocation in the 13.4-13.65 GHz band with provisions that limited the FSS pfd levels to be 5.7 dB more stringent than otherwise allowed by the Radio Regulations. This restriction will further ensure that EESS (active) operations will not be affected by FSS (s-E) operations in the band. This outcome exceeds SFCG objectives.

For Region 1 the Conference decided on a FSS (E-s) allocation in the 14.5-14.8 GHz band with restrictions on FSS (E-s) operation and deployment. The allocation is also limited to only a few countries in Region 1 as included in Resolution **163 (WRC-15)**. The grandfathering provision which would have constrained the future development of DRS systems was successfully removed from the solution adopted

Evaluation

SFCG objectives were successfully achieved.

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)**;

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.

As is the case for AI 1.6.1, 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, precipitations radars and scatterometers) by missions such as Cryosat, Jason-2, -3, Jason-CS, Sentinel-3, and HY-2. Prior and new studies have shown incompatibility between these services. 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, which will not be the case if an allocation is made to the FSS (E-to-s). Therefore, SFCG supports no new allocation to FSS (Earth-to-space) in the band 13.25-13.75 GHz.

Other science 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. 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.

Result

For Region 2 the Conference decided on a FSS (E-s) allocation in the 14.5-14.8 GHz band with restrictions on FSS (E-s) operation and deployment. For Region 3 the Conference decided on a FSS (E-s) allocation in the 14.5-14.75 GHz band with restrictions on FSS (E-s) operation and deployment. The allocation is also limited to only a few countries in Regions 2 and 3 as included in Resolution **164 (WRC-15)**. The grandfathering provision, for both Regions 2 and 3, which would have constrained the future development of DRS systems was successfully removed from the solution adopted by the Conference.

Evaluation

SFCG objectives were successfully achieved.

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)**;

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. SFCG assumes that any change from the existing fixed distances from shore will be verifiable and enforceable.

Result

The Conference agreed to modify RR No. **5.457A** to accommodate ESV antennas as small as 1.2 meters in the band 5 925-6 425 MHz. No changes were made to the existing sharing situation in the 14-14.5 GHz band.

Evaluation

SFCG objectives were successfully achieved.

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;

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 need 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 without placing undue burden on SRS and SOS mission operators.

Since no satisfactory solutions to ensure compatibility have been identified to date, SFCG favours NOC.

Result

Some regional groups (CITEL, APT, and RCC) had positions of No Change. The Regional groups with Fixed Service interests (terrestrial microwave), namely ASMG and ATU also had positions of No Change. Over the course of the Conference, none of the Regional groups holding a position of No Change altered their view.

Evaluation

SFCG objectives were successfully achieved.

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;

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. SFCG supports either NOC or an MMSS downlink only but opposes making both an uplink and a downlink allocation to MMSS.

Result

Proposals to the Conference were a mix of NOC and MMSS downlink only. Some administrations proposed NOC for the 8 025-8 400 MHz band while expressing an openness to consider an MMSS downlink.

The regional groups supporting NOC, agreed to compromise and support the proposal which provided only for a downlink in 7 375-7 750 MHz with NOC for the 8 025-8 400 MHz band with regard to the uplink, and pfd limitations would ensure protection of incumbent terrestrial services.

Evaluation

SFCG objectives were successfully achieved.

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)**;

SFCG Objective

SFCG supports the protection of all the space science bands in the range 22-26 GHz considered under this agenda item.

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

- The SRS Earth-to-space allocation in the band 22.55 – 23.15 GHz
- The inter-satellite band 22.55 – 23.55 GHz and the first 750 MHz of the inter-satellite band 25.25 – 27.5 GHz.
- 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
- The first 500 MHz of the EESS/SRS space-to-Earth band 25.5 – 27.0 GHz

No new allocations to the MSS should be made, since the sharing studies are either missing or show that there may be unacceptable limitations to the existing services therefore SFCG supports NOC.

Result

This Agenda Item was the subject of extensive debate. However, WRC-15 agreed to NOC to the table of allocations and suppression of Resolution **234 (WRC-12)**.

Evaluation

SFCG objectives were successfully achieved.

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)**;

SFCG Objective

SFCG supports a primary allocation to EESS (E-s) in the band 7 190-7 250 MHz, with addition of an appropriate provision to avoid any restriction on existing and future SRS earth stations from GSO EESS systems. This would satisfy the EESS spectrum requirements identified. The frequency range 7 235-7 250 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 7 190-7 235 MHz. SFCG does not support an allocation to EESS (E-to-s) in the 7 145-7 190 MHz band due to incompatibility with SRS (deep space). SFCG does not support the unjustified application of RR No. **9.21** for operation of EESS systems with regard to SOS as it would make EESS de-facto secondary to SOS without any technical justification.

Result

The Conference adopted a new allocation for EESS (E-to-s) in the band 7 190-7 250 MHz with footnotes ensuring the protection of existing fixed and mobile service allocations. In addition, in the band 7 190-7 235 MHz, EESS satellites in geostationary orbit shall not claim protection from existing and future stations of the space research service.

Evaluation

SFCG objectives were successfully achieved.

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)**;

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.

SFCG recognizes that the compatibility with SRS (space-to-Earth) links in the 8400-8500 MHz frequency band is ensured with the application of Recommendation ITU-R RS.2065 to be incorporated by reference.

Result

WRC-15 decided to provide 600 MHz primary allocation, in the frequency bands 9 200-9 300 MHz and 9 900-10 400 MHz, to EESS (active) band on a global basis with footnotes conditioning how this additional 600 MHz spectrum can be used, protection of radiolocation, radionavigation services, protection of RAS and SRS operations in adjacent bands, and a country footnote which requires RR No. **9.21** coordination with specified countries prior to use of these bands.

Evaluation

SFCG objectives were successfully achieved.

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)**.

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. SFCG objectives are met by the single method included in the CPM Report to satisfy this agenda item. .

Result

There was only one method included in the CPM Report for AI 1.13 which aligned with SFCG's objectives. All regions submitted proposals supporting this Method. The issue was one of the first to clear Plenary. WRC-15 decided to remove the 5 km distance and EVA restrictions in RR No. **5.268** and revise the footnote.

Evaluation

SFCG objectives were successfully achieved.

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;

SFCG Objective

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

Result

The Conference agreed to a new Resolution outlining the responsibilities of the ITU with respect to the dissemination of time signal via radiocommunication versus the responsibilities of the BIPM and its other umbrella bodies with respect to the definition of the UTC time scale. The Resolution references Recommendation ITU-R TF.460-6 and resolves that it will serve as a basis for defining UTC within the Radio Regulations until WRC-23, thus providing eight years for discussions between the ITU and BIPM (among others).

Evaluation

The SFCG objectives were met.

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)**;

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. SFCG objectives appear to be met by the single method included in the CPM Report.

Result

The Conference agreed to the single method to address AI 1.17 in the CPM Report – namely to make a primary AM(R)S allocation to the 4 200-4 400 MHz band. Compliance with ICAO Standards and Recommended Practices (SARPS) to be developed in the future is required for WAIC systems.

At WRC-15, virtually no opposition to the draft resolution was encountered, other than minor issues which were quickly resolved, and the resolution was approved early in the second week of the Conference. In addition, Resolution **424 (WRC-15)** brings to the attention of ICAO Recommendation ITU-R M.2085 which provides the e.i.r.p. limits required to protect EESS (active) operations.

Evaluation

SFCG objectives were successfully achieved.

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)**;

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. Preference is expressed 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.

Result

The Conference decided on an allocation to the radiolocation service in the frequency band 77.5-78 limited to short-range radar for ground-based applications, including automotive radars. This decision was to also allow for use of these radar applications on aircraft while on the ground but specifically not while in flight.

Evaluation

SFCG objectives were successfully achieved.

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;

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 seven issues of primary interest to space science services.

1. 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 (AI 7 Issue A).
2. Publication of Bringing Into Use (BIU) information by the BR. SFCG supports any method allowing quick and easy access to up to date information on satellites BIU (AI 7 Issue B).
3. CPM Report proposes that either:
 - a) suppresses the required Advance Publication Information submissions for satellite networks that are subject to coordination provisions in the Radio Regulation; or,
 - b) eliminates the six months required between receipt of API and coordination submissions.

SFCG would oppose this being applied to NGSO space science systems not subject to coordination under Section II of Article 9 (AI 7 Issue C).

4. SFCG is of the view that the Radio Regulation should support a balanced perspective for maintaining flexibility of manoeuvres while avoiding any abuse on the use of one space station to bring into use frequency assignments at different orbital locations within a short period of time (AI 7 Issue H).
5. SFCG supports amending Table 10 (Annex 7) in Appendix 7 of the Radio Regulations to add a row adjusting the predetermined coordination distance between mobile (aircraft) stations and space research earth stations in the 2 200-2 290 MHz band to a value of 880 km in order to ensure proper protection of the SRS Earth stations (AI 7 Issue XYZ).
6. 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 the ITU-R and that any such changes be carefully developed to ensure they apply exclusively to nanosatellites or picosatellites.

Note: This issue is further discussed under Agenda Item 9.1.8 below.

7. 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).

Note: This topic is not addressed in the CPM Report but has been raised during previous WRCs as there is an applicable RRB Rule of Procedure.)

Result

1. Provision No. **11.49** was clarified to incentivize administrations to inform the Bureau within six months of a suspension and penalize administrations with a day-for-day penalty beyond the six months.
2. The ITU-R will continue a page on the space services portion of their website publishing expected and confirmed dates of bringing into use.
3. The Conference agreed to modify the API mechanism by eliminating the submission of APIs subject to coordination. Instead, the Bureau will automatically generate the API from the submitted coordination request and publish both in International Frequency Information Circulars as they are processed.
4. Nos. **11.44B** and **11.49** of the Radio Regulations were revised at WRC-12 in order to clarify issues regarding the bringing into use, or resumption of use after a suspension, of frequency assignments associated with satellite networks. While adopting these revised provisions, WRC-12 recognized that the issue of using one space station to bring frequency assignments at different orbital locations into use within a short period of time was not the intent of these revised provisions. WRC-15 agreed to codify the instructions to the Bureau from the plenary minutes of WRC-12.
5. While viewed by SFCG members as a satellite filing issues which should be addressed under Agenda Item 7, it was attributed at WRC-15 to be addressed under Agenda Item 5 (Review of the Report of the Radiocommunication Assembly).

During the meeting of the Radio Assembly, which was held before the WRC-15, the need for modification of Table 10 (Annex 7) in Appendix 7 of RR, to specify 880 km for predetermined coordination distance between SRS Earth stations and mobile (aircraft) stations, was included in Addendum 7 to the Report of the Director of the Radiocommunication Bureau to WRC-15. In his report, the Director, in accordance with invites 1 of Resolution 74 (Rev. WRC-03), invited WRC-15 to consider the revision of Appendix 7 of the Radio Regulations as shown above.

During the WRC-15 proceedings, this issue was adopted by Working Group 5A, Committee 5 and consequently by the Plenary with no opposition by any administration.

6. This issue was not addressed under Agenda Item 7 at WRC-15. It was considered under Agenda Item 9.1.8 addressing Resolution **757 (WRC-12)**.

7. This issue was not addressed at WRC-15. Therefore, the existing Rule of Procedure which is preferred by SFCG remains in force and links between non-geostationary satellites and geostationary satellites do not require coordination.

Evaluation

The main areas of interest for SFCG members with respect to this agenda item were resolved in accordance with SFCG objectives.

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)**)

SFCG Objective

SFCG supports a revision of Resolution **205 (Rev WRC-12)** containing protection measures such as the implementation of guard bands from 405.9 MHz to 406 MHz and from 406.1 to 406.2 MHz, as contained in the single method of the CPM Report to WRC-15.

Result

Fourteen proposals were submitted to the Conference, and all of them (with a few editorial differences) proposed the single method for addressing this agenda item. The editorial differences were resolved in two drafting sessions. The resulting text, proposing changes to Article **5** and Resolution **205 (Rev.WRC-15)**, were approved in both first and second reading at the 6 November WRC-15 plenary. Emergency locator beacon transmissions in the 406-406.1 MHz band gained needed additional protection

Evaluation

SFCG objectives were successfully achieved.

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 frequency band 3 400-4 200 MHz for the dissemination of meteorological data.

Result

The Conference adopted a modification to Resolution **154 (Rev. WRC-15)**, calling for relevant administrations in Region 1 to use special care in the coordination, assignment, and management of frequencies, taking into consideration the potential impact on the FSS earth stations used for satellite communications related to safe operation of aircraft and reliable distribution of meteorological information in the frequency band 3 400-4 200 MHz.

Evaluation

SFCG objectives were successfully achieved.

Agenda Item 9.1.8 Regulatory aspects for nanosatellites and picosatellites under Resolution 757 (WRC-12)

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.

SFCG noted the complexity in obtaining a common definition of which types of satellites should be classified under the category nanosatellites and picosatellites and the fact that these definitions tend to relate to elements that are not relevant from a frequency management perspective (size, mass, cost).

SFCG is of the opinion that any satellite, including nanosatellites and picosatellites, will have to be registered with the ITU-R and must adhere to the ITU-R Radio Regulations.

Any changes to the RR to facilitate the development of nanosatellites and picosatellites should be carefully developed to ensure protection of all satellite missions.

Result

The Conference decided that, given the conclusions of the ITU-R Reports developed within Working Party 7B, modifications to the Radio Regulations, particularly Articles **9** and **11**, to address nano-and picosatellites at WRC-15 were not warranted. Such modifications could add additional complications to the Radio Regulations for all satellite systems.

In addition, a future conference agenda item dedicated to nanosatellite and picosatellite issues with filing procedures for registering satellite networks is not needed. Any issues identified for these types of satellites can be addressed under the normal work of the WRC standing agenda item 7 for issues pertaining to satellite networks. The Conference took no action and concluded agenda item 9.1.8, with the suppression of Resolution **757 (WRC-12)**.

Evaluation

SFCG objectives were successfully achieved, however, the subject of nanosatellites and picosatellites may be considered further at WRC-19.

Agenda Item 9.2 *on any difficulties or inconsistencies encountered in the application of the Radio Regulations;*

Agenda Item 9.2.2 *Clarification of the use of deep space allocations in regard to certain provisions of the Radio Regulations*

SFCG Objective

SFCG supports clarifying the use of deep space allocations during near-Earth phases of deep space missions. SFCG notes that Chapter 2 of the CPM report provides two Methods to provide such clarification in the Radio Regulations. SFCG supports adding a provision in RR Article **4**, to clarify that space research systems intended to operate in deep space may also use the space research service (deep space) allocations, with the same status as the allocation, when the spacecraft is near the Earth, such as during launch, early orbit, flying by the Earth, and returning to the Earth. This Method is an acceptable solution to the issue and would avoid the potential unintended consequences of modifying a definition in RR Article 1.

Result

Nearly identical proposals to add a provision in RR Article **4** were put forward by multiple regional groups. However, a proposal to redefine “space research service” in Article **1**, Terms and definitions, was put forward by one region. This proposal was not supported and a decision to modify Article **4** was quickly agreed.

Evaluation

SFCG objectives were successfully achieved.

Agenda item 9.2.XYZ RFI reporting for sensors

SFCG Objective

In case WRC-15 will address under agenda item 9.2 the issue of RFI reporting for spaceborne sensors SFCG will support this course of action as suitable alternative to a new WRC-19 agenda item.

Result

No action was taken on this issue at WRC-15.

Evaluation

Work on this topic will continue in ITU-R Working Party 7C under Question ITU-R 255/7.

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,

SFCG supports the inclusion of the following items on the WRC-19 agenda:

SFCG Objective

Agenda Item X.X1 *to consider the upgrade to a primary allocation for the meteorological-satellite service (space-to-Earth), and the addition of a primary allocation to the Earth exploration-satellite service (space-to-Earth) in the frequency band 460-470 MHz, while maintaining relative priority of the meteorological satellite service over the Earth exploration-satellite service as contained in 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.

Result

The Conference adopted WRC-19 Agenda Item 1.3 which is supported by Resolution **766 (WRC-15)**

SFCG Objective

Agenda item X.X2 *to establish mandatory e.i.r.p. limits in the MSS, METSAT or EESS allocations in the 401-403 MHz and 399.9-400.05 MHz frequency bands.*

SFCG supports this agenda item in view of establishment of mandatory e.i.r.p. limits in the Radio Regulations, applicable in the MSS, METSAT or EESS allocations in the 401-403 MHz and 399.9-400.05 MHz frequency bands in order to ensure the intra-service compatibility, in particular for protection of existing and future data collection platform systems.

Result

The Conference adopted WRC-19 Agenda Item 1.2 which is supported by Resolution **765 (WRC-15)**

Evaluation

SFCG objectives were successfully achieved.
