



**European Space Agency (ESA)**  
**SFCG OBJECTIVES FOR WRC-19**

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



***FOR THE 2019  
WORLD RADIOCOMMUNICATION  
CONFERENCE***

*September 2017*



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**Introduction**

This document presents the objectives of SFCG members concerning issues affecting space science services on the agenda of the World Radiocommunication Conference 2019 (WRC-19). The contents may be used by SFCG members to inform their Administrations and regional groups, and to facilitate conference preparation and WRC consideration.

The presentation is organized to align with the Agenda for the WRC-19 as presented in Resolution 809 (WRC-15). 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 (RR) 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.

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. The successful operation of these passive sensors depends on the use of specific frequency bands that are defined by physical laws.

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**Agenda Item 1.2** to consider in-band power limits for earth stations operating in the mobile-satellite service, meteorological-satellite service and Earth exploration-satellite service in the frequency bands 401-403 MHz and 399.9-400.05 MHz, in accordance with Resolution **765 (WRC-15)**;

This agenda item was created as a result of the significant recent increase in use of these frequency bands for telemetry, tracking and command (TT&C) purposes. This increase is largely attributable to increased interest by educational institutions in operating research satellites and private and commercial entities seeking to operate large constellations of satellites. The proliferation of such TT&C usage potentially poses a significant impact upon the large number of existing lower power data collection system (DCS) stations communicating to sensitive receivers on GSO and non-GSO satellites. Tens of thousands of DCS stations are deployed worldwide for the purpose of collecting essential weather and climate data. Work under this item is to determine the potential impact of high power TT&C operations and to determine what, if any, power limitations are appropriate to protect the vital DCS operations.

### *SFCG Objective*

SFCG supports studies and analyses under Agenda Item 1.2 to establish appropriate in-band power limits for earth stations operating in mobile-satellite service (399.9-400.05 MHz), the meteorological-satellite service (401-403 MHz) and the Earth exploration-satellite service (401-403 MHz), in order to preserve, on a long term basis, the operation of Data Collection Systems. For this purpose, a set of in-band power/e.i.r.p. limits will have to be tailored to ensure the operations of both NGSO and GSO systems.

This agenda item may be impacted by activities under WRC-19 AI 1.7, since the band 401-403 MHz is identified as a candidate band for a new space operations service (SOS) uplink allocation. Negative impacts on the DCS activities in 401-403 MHz should be avoided. Therefore, any potential new allocation to SOS added to this band under Agenda Item 1.7 would have to be consistent with those limits established under Agenda Item 1.2.

**Agenda Item 1.3** to consider possible upgrading of the secondary allocation to the meteorological-satellite service (space-to-Earth) to primary status and a possible primary allocation to the Earth exploration-satellite service (space-to-Earth) in the frequency band 460-470 MHz, in accordance with Resolution **766 (WRC-15)**;

This agenda item is related to downlink communications for the data collection system (DCS) networks, meteorological-satellite service (MetSat), whose uplinks are considered under AI 1.2. The DCS system downlinks have been operating globally under a secondary allocation and on a primary basis in some countries under RR No. **5.290** subject to the agreement by administrations under RR Article **9.21**. These regulatory conditions pose a barrier to implementation of essential DCS components on a global basis. AI 1.3 seeks to remedy the status quo by studying and developing criteria which would allow the meteorological-satellite service to operate globally on a co-primary basis with terrestrial based operations in the fixed and mobile services, while not constraining such terrestrial operations. RR No. **5.289** also allows EESS space-to-Earth communications on a non-interference basis but constrains such operations to also be secondary to the MetSat operations permitted under that note. In

view of a growing usage of this spectrum by EESS satellite networks, AI 1.3 seeks to consider raising this service allocation to co-primary with respect to the terrestrial services but maintaining it as secondary to the MetSat operations.

A primary allocation to the MetSat service and EESS (downlink) in the frequency band 460-470 MHz would provide regulatory certainty/stability for space and meteorological agencies deeply involved in satellite data collection programs and the public sectors funding the development and operation of such systems in order to be able to provide long-term continuity for this service of public interest.

It should be noted that a power flux density limit of  $-152 \text{ dBW/m}^2/4 \text{ kHz}$  applies in at least one administration for protection of terrestrial services.

### *SFCG Objective*

SFCG supports studies and analyses under Agenda Item 1.3 and the effort to raise the regulatory status of MetSat and EESS space-to-Earth usage. SFCG recognizes the need for harmonization of the global operating environment to allow full development of critical MetSat/EESS systems.

The MetSat (space-to-Earth) allocation should be upgraded from secondary to primary status and a primary EESS (space-to-Earth) allocation should be added in the frequency band 460-470 MHz while providing protection for and not imposing any additional constraints on existing primary services to which the frequency band is already allocated. This should be realised while retaining the priority of MetSat over EESS as currently expressed in the RR. The SFCG does not support limitations on an upgraded allocation which would make the allocation effectively unusable.

**Agenda Item 1.5** to consider the use of the frequency bands 17.7-19.7 GHz (space-to-Earth) and 27.5-29.5 GHz (Earth-to-space) by earth stations in motion communicating with geostationary space stations in the fixed-satellite service and take appropriate action, in accordance with Resolution **158 (WRC-15)**;

Resolution **158 (WRC-15)** resolves to invite ITU-R to study:

- “the technical and operational characteristics and user requirements of different types of earth stations in motion that operate or plan to operate within geostationary FSS allocations in the frequency bands 17.7-19.7 GHz and 27.5-29.5 GHz, including the use of spectrum to provide the envisioned services to various types of earth station in motion and the degree to which flexible access to spectrum can facilitate sharing with services identified in *recognizing further a) to n)*”;
- “sharing and compatibility between earth stations in motion operating with geostationary FSS networks and current and planned stations of existing services allocated in the frequency bands 17.7-19.7 GHz and 27.5-29.5 GHz to ensure protection of, and not impose undue constraints on, services allocated in those frequency bands, and taking into account *recognizing further a) to n)*”.

Within these frequency ranges the band 18.6-18.8 GHz is allocated to the Earth exploration-satellite service (passive) on a primary basis in all three Regions and to the space research service (passive) on a secondary basis in Regions 1 and 3 and on a primary basis in Region 2.

### *SFCG Objective*

SFCG does not oppose the use of the 17.7-19.7 GHz by earth stations in motion communicating with geostationary space stations in the fixed-satellite service provided that the transmit characteristics of the FSS satellites do not change as a result of this agenda item.

**Agenda Item 1.6** to consider the development of a regulatory framework for non-GSO FSS satellite systems that may operate in the frequency bands 37.5-39.5 GHz (space-to-Earth), 39.5-42.5 GHz (space-to-Earth), 47.2-50.2 GHz (Earth-to-space) and 50.4-51.4 GHz (Earth-to-space), in accordance with Resolution **159 (WRC-15)**;

Resolution **159 (WRC-15)** invites the ITU-R, *inter alia*, to conduct and complete, in time for WRC-19 studies of possible necessary revisions to Resolution **750 (Rev.WRC-15)** to ensure protection of the EESS (passive) in the frequency bands 36-37 GHz and 50.2-50.4 GHz from non-GSO FSS transmission, including study of aggregate FSS interference effects from networks and systems operating or planned to operate in the frequency bands 37.5-42.5 GHz (space-to-Earth), 47.2-50.2 GHz (Earth-to-space) and 50.4-51.4 GHz (Earth-to-space).

### *SFCG Objective*

SFCG supports studies to consider a review of the regulatory framework for non-GSO and GSO FSS satellites systems addressed under WRC-19 AI 1.6. However, SFCG does not support revisions to the existing regulatory framework for non-GSO FSS systems unless protection of space science services, including passive sensing, is ensured. This may require revisions to Resolution **750 (Rev.WRC-15)** to ensure protection of the EESS (passive) in the frequency bands 36-37 GHz and 50.2-50.4 GHz from non-GSO and GSO FSS transmissions. It is to be noted that studies in the bands 37.5-38 GHz and 40-40.5 GHz are not listed in Resolution **159 (WRC-15)**, but will be needed.

**Agenda Item 1.7** to study the spectrum needs for telemetry, tracking and command in the space operation service for non-GSO satellites with short duration missions, to assess the suitability of existing allocations to the space operation service and, if necessary, to consider new allocations, in accordance with Resolution **659 (WRC-15)**;

Resolution **659 (WRC-15)** calls for study of the spectrum needs for telemetry, tracking and command in the space operation service for non-GSO satellites with short duration missions, to assess the suitability of existing allocations to the space operation service and, if necessary, to consider new allocations within the frequency ranges 150.05-174 MHz and 400.15-420 MHz.

### *SFCG Objective*

SFCG recognizes the growing number of short duration non-geostationary orbit satellite missions and the associated spectrum requirements resulting from this activity. Therefore, SFCG supports studies and analyses under Agenda Item 1.7 in order to satisfy the invites of Resolution **659 (WRC-15)**.

SFCG is of the view that new SOS allocations or updates to existing SOS allocations are favourable to accommodate the growing number of short duration non-GSO satellites. However, any new regulatory measures under this AI should assure three key elements:

- An unambiguous definition must be given about what constitutes a “satellite with short duration mission”:
  - A system with a period of validity of not more than three years.
  - A system consisting of one or multiple spacecraft where at any time only one spacecraft is transmitting.
  - The case of a (or multiple) spacecraft with a lifetime of not more than three years, where the operator launches a (or multiple) replenishment/replacement spacecraft(s) such that the operator has persistent frequency and orbital characteristics and capabilities longer than three years, is not a short duration mission.
- The solution shall not have negative impacts on science services already operating in the frequency bands proposed. Due to the importance of the frequency band 401-403 MHz for Data Collection Systems (GSO and non-GSO), any potential new allocation to SOS in this band added under this Agenda Item would have to be consistent with those limits established under Agenda Item 1.2.
- Any consideration of bands for use under this agenda item must exclude the 406-406.1 COSPAS-SARSAT band as well as appropriate guard bands (see *resolves* 1, Resolution **205 (WRC-15)** and Working Party 7B studies).

**Agenda Item 1.11** to take necessary actions, as appropriate, to facilitate global or regional harmonized frequency bands to support railway radiocommunication systems between train and trackside within existing mobile service allocations, in accordance with Resolution **236 (WRC-15)**;

Resolution **236 (WRC-15)** calls for “necessary action” to facilitate global or regional harmonized frequency bands, to the extent possible, for the implementation of railway radiocommunication systems between train and trackside, within existing mobile service allocations. Depending on the results of ITU-R studies this may include the identification and allocation of appropriate spectrum.

### *SFCG Objective*

SFCG supports the protection of existing allocations of space science services. Since there is no consensus on frequency bands for study, SFCG will monitor this agenda item at this time.

**Agenda Item 1.12** to consider possible global or regional harmonized frequency bands, to the maximum extent possible, for the implementation of evolving Intelligent



Transport Systems (ITS) under existing mobile service allocations, in accordance with Resolution **237 (WRC-15)**;

Resolution **237 (WRC-15)** calls WRC-19 to consider possible global or regional harmonized frequency bands for the implementation of evolving ITS under existing mobile service allocations.

*SFCG Objective*

SFCG supports the protection of existing space science service allocations. Since no specific frequency bands of interest to SFCG are currently under study, SFCG does not have specific concerns about this agenda item at this time.

**Agenda Item 1.13** to consider identification of frequency bands for the future development of International Mobile Telecommunications (IMT), including possible additional allocations to the mobile service on a primary basis, in accordance with Resolution **238 (WRC-15)**;

Resolution **238 (WRC-15)** resolves that the appropriate sharing and compatibility studies are to take “into account the protection of services to which the band is allocated on a primary basis, for the frequency bands:

- 24.25-27.5 GHz, 37-40.5 GHz, 42.5-43.5 GHz, 45.5-47 GHz, 47.2-50.2 GHz, 50.4-52.6 GHz, 66-76 GHz and 81-86 GHz, which have allocations to the mobile service on a primary basis; and
- 31.8-33.4 GHz, 40.5-42.5 GHz and 47-47.2 GHz, which may require additional allocations to the mobile service on a primary basis,

The appropriate sharing and compatibility studies are to include studies with respect to services in adjacent bands, as appropriate. When conducting studies in the band 24.5-27.5 GHz the need to ensure the protection of existing earth stations and the deployment of future receiving earth stations under the EESS (space-to-Earth) and SRS (space-to-Earth) allocation in the frequency band 25.5-27 GHz will be taken under account.”

The consideration of the frequency bands targeted by Agenda Item 1.13 involves a number of adjacent bands used by passive sensing instruments for which the possible impact of unwanted emissions into the passive bands need to be studied. The following table shows which passive sensing bands could be affected by such unwanted emissions of 5G (IMT-2020) deployments:

<b>EESS (passive) band</b>	<b>5G (IMT-2020) band</b>
23.6-24 GHz	24.25-27.5 GHz
31.3-31.8 GHz	31.8-33.4 GHz
36-37 GHz	37-43.5 GHz
50.2-50.4 GHz	47.2-50.2 GHz & 50.4-52.6 GHz
52.6-54.25 GHz	50.4-52.6 GHz
86-92 GHz	81-86 GHz

## *SFCG Objective*

SFCG supports the protection of existing space science service allocations. No new allocation/identification of spectrum to support mobile broadband systems (IMT-2020) should be made in or adjacent to bands allocated to space science services unless acceptable criteria and conditions are developed and implemented that ensure the protection and future usability of the concerned bands by those services. SFCG does not support consideration of any frequency band that is not included in the list of potential candidate bands as identified in Resolution **238 (WRC-15)**.

With regard to the issue of in-band sharing, a particularly critical situation concerns the band 25.5-27 GHz which is expected to be heavily used by many future EESS and SRS satellite missions for data downlinks. As recognized in Resolution **238 (WRC-15)** (footnote 2 of *resolves* 2) for the 25.5-27 GHz band, it is fundamental for SFCG Member Agencies to be assured that EESS and SRS earth stations will continue to be able to expand in the future both in terms of number of satellites serviced and number of earth stations. Licences for these earth stations, which inherently provide protection from interference by IMT-2020 systems, must not be denied or restricted on the basis that such action may limit the IMT-2020 operational areas. Negative experiences in the past with earlier cellular mobile systems in the band 2110-2120 MHz must not be repeated.

Internationally agreed mechanisms and criteria should therefore be identified to ensure the future availability of these earth station licences. It is necessary to ensure that the IMT-2020 systems will be deployed only in urban and suburban areas, as is assumed in all of the compatibility studies and as stated by WP 5D.

Protection of the various EESS (passive) bands adjacent to bands studied under this Agenda Item (23.6-24 GHz, 31.3-31.8 GHz, 36-37 GHz, 50.2-50.4 GHz, 52.6-54.25 GHz and 86-92 GHz) should be ensured by identifying suitable unwanted emission limits for IMT-2020 devices. Most of these bands are protected under RR No. **5.340**. Unwanted emission limits will have to be implemented in the regulations, preferably by inclusion in Resolution **750 (Rev.WRC-15)**.

Other specific concerns of SFCG are:

- Protection of the 25.25-27.5 GHz band allocated to inter-satellite service (ISS) on primary basis, used for data relay satellite return links;
- Protection of the 31.8-32.3 GHz band allocated to SRS deep space (s-E) on primary basis and is used for transmitting data to the Earth from distant locations in space;
- Protection of the 37-38 GHz band allocated to SRS (space-to-Earth), and the 40-40.5 GHz band allocated to EESS/SRS (Earth-to-space).

Frequency overlaps with other WRC-19 AI's (1.6 and 1.14) need to be taken into account.

**Agenda Item 1.14** to consider, on the basis of ITU-R studies in accordance with Resolution **160 (WRC-15)**, appropriate regulatory actions for high-altitude platform stations (HAPS), within existing fixed service allocations;

Resolution **160 (WRC-15)** calls for studies to be conducted to facilitate access to broadband applications delivered by HAPS, including additional spectrum needs for gateway and fixed terminal links for HAPS. One of the tasks under AI 1.14 is to undertake studies to assess the spectrum needs of HAPS in the frequency bands of 38-39.5 GHz on a global level and 21.4-22 GHz and 24.25-27.5 GHz in Region 2. It is to be noted that HAPS downlinks will have a more severe impact to EESS and SRS receiving earth stations than HAPS uplinks. However, HAPS uplinks may have potential impact on adjacent band EESS (passive) sensor operations.

### *SFCG Objective*

Assuming that the ITU-R studies show a need for identification of additional spectrum for HAPS in Region 2, SFCG does not support the identification of frequency bands in 21.4-22 GHz and 24.25-27.5 GHz for HAPS, unless acceptable sharing conditions are agreed upon that do not adversely impact the space research, Earth exploration-satellite, or inter-satellite services.

As with AI 1.13, a particularly critical situation concerns the band 25.25-27.5 GHz which is expected to be heavily used globally for data downlinks by many future EESS and SRS satellite missions. Within this band, inter-satellite links must also remain protected. This band is indicated as a candidate band for HAPS identification only for Region 2.

Identification of the band 24.25-27.5 GHz for HAPS under this agenda item must also be supported by studies showing the 21.2-21.4 GHz and 23.6-24.0 GHz EESS (passive) bands will be adequately protected from the HAPS unwanted emissions.

**Agenda Item 1.15** to consider identification of frequency bands for use by administrations for the land-mobile and fixed services applications operating in the frequency range 275-450 GHz, in accordance with Resolution **767 (WRC-15)**;

Resolution **767 (WRC-15)** calls for sharing and compatibility studies regarding the introduction of land-mobile and fixed services into the frequency range 275-450 GHz. RR No. **5.565** identifies nine of the bands in this frequency range for use by administrations for EESS (passive) and SRS (passive) applications: 275-286 GHz, 296-306 GHz, 313-356 GHz, 361-365 GHz, 369-392 GHz, 397-399 GHz, 409-411 GHz, 416-434 GHz and 439-467 GHz.

### *SFCG Objective*

SFCG supports the identification of frequency bands for use by systems operating in the land-mobile and fixed services, as long as these applications are compatible with passive sensors and do not cause interference to the passive use of the bands identified in RR No. **5.565**. SFCG supports the concept that no allocations will be made to any service above 275 GHz at WRC-19.

**Agenda Item 1.16** to consider issues related to wireless access systems, including radio local area networks (WAS/RLAN), in the frequency bands between 5 150 MHz and 5 925 MHz, and take the appropriate regulatory actions, including additional

spectrum allocations to the mobile service, in accordance with Resolution **239 (WRC-15)**;

The 5250-5570 MHz portion of the band is allocated worldwide on a primary basis to the EESS (active) and SRS (active) services and the 5350-5470 MHz portion currently has no mobile allocation. The EESS (active) allocation in 5350-5470 MHz supports a number of Earth observation missions including Sentinel-1, Sentinel-3, Sentinel-6, JASON, SCA, Radarsat-2, and Radarsat-3. Part of the work of AI 1.16 is to conduct further sharing studies to identify RLAN mitigation techniques that may facilitate sharing between WAS/RLAN systems and incumbent services in the 5150-5350 MHz, 5350-5470 MHz, 5725-5850 MHz, and 5850-5925 MHz bands. This includes studies to identify mitigation techniques that may allow sharing between WAS/RLAN systems and EESS (active) and SRS (active) systems in the 5350-5470 MHz band.

### *SFCG Objective*

SFCG supports a review of the RLAN spectrum, technical and operational requirements in the 5 GHz range, as requested by Resolution **239 (WRC-15)** as pre-requisite to any further sharing studies in the range.

For the 5250-5350 MHz band, SFCG supports:

- 1) Verifying if the assumptions made in the studies leading to the mobile allocation for RLANs in that band are still valid and applicable to the current and planned use of the band by RLANs;
- 2) Studying the potential impact on EESS (active) systems of the possibility to authorise outdoor RLAN usage. SFCG however cannot support changing the WAS/RLAN operating conditions in 5 250-5 350 MHz as given in Resolution **229 (WRC-12)**, since current studies presented in ITU-R have shown that such a change would not ensure protection of EESS (active) sensors.

For the 5350-5470 MHz band, taking into account latest developments in ITU-R WP 5A, SFCG is opposed to a new mobile allocation for RLAN since no new RLAN mitigation techniques have been proposed by the RLAN industry or have been shown to be effective, sufficient to ensure protection of all types of EESS (active) sensors in that band, namely SAR, altimeters and scatterometers. Therefore, SFCG supports the single method currently identified in the draft CPM text for this band, i.e. NOC.

For EESS (active) altimeters covering the entire 5250-5570 MHz band, SFCG supports studying potential RLAN mitigation techniques on the basis of *invites 2* of Resolution **229 (rev. WRC-12)**.

**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)**, in order 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 WRC 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 shall monitor all the issues covered under this AI to ensure that any possible change will not adversely impact space science services.

So far SFCG has identified one issue of specific interest to space science services:

Issue H: For this issue SFCG supports the initiative to introduce additional orbital data in the NGSO API describing a non-GSO satellite when submitting an API and/or CR/C package. The current proposal is to add into the Appendix 4 tables for API information the right angle of ascending node (RAAN) and argument of perigee. This would allow the proper modelling of the orbit of new satellite network filings and may also be of use to SFCG members.

Issues B, C and E through G do not concern SFCG as they pertain to the FSS and BSS Plans.

As long as Issue A involves only large non-GSO constellations or systems subject to coordination under Section II of Article 9 and is constrained to the FSS, it should not present a concern to SFCG.

Issue D relates to publication of a list of potentially affected networks at the time of coordination which may be useful for SFCG members.

**Agenda Item 9.1 (Issue 9.1.1)** Resolution 212 (Rev.WRC-15) - Implementation of International Mobile Telecommunications in the frequency bands 1 885-2 025 MHz and 2 110-2 200 MHz

Resolution 212 (Rev.WRC-15) calls for the study of measures to ensure compatibility between the MSS and IMT networks using the above bands. One of these bands is adjacent to the downlink band 2 200-2 290 MHz which is widely used by the space science services. Recommendations ITU-R M.2070 and M.2071 dealing with unwanted emissions from base and mobile IMT stations respectively as well as Recommendation ITU-R M.1036 dealing with frequency arrangements do recognize the requirement to protect the adjacent band without specifying limits.

### *SFCG Objective*

SFCG should continue to monitor the developments of this agenda item in WPs 4C and 5D for any potential outcomes that could degrade the use of the 2 200-2 290 MHz and 2025-2110 MHz bands by the space science services. It is to be noted that unwanted emissions by SRS/EESS/SOS (Earth-to-space) may in turn interfere with terrestrial IMT and satellite-based IMT (MSS) in the 1885-2025 MHz band.

**Agenda Item 9.1 (Issue 9.1.4)**

**Resolution 763 (WRC-15)** - Stations on board sub-orbital vehicles

Resolution **763 (WRC-15)** invites administrations to conduct studies to identify any required technical and operational measures, in relation to stations on board sub-orbital vehicles, that could assist in avoiding harmful interference between radiocommunication services, and to determine any spectrum requirements for sub-orbital vehicles. The Resolution notes that developments related to aircraft and other vehicles has resulted in a situation where these craft may fly beyond the nominally accepted boundary between Earth's atmosphere and space (100 km altitude), crossing the boundary between space communications and terrestrial communications. These vehicles have communications requirements (such as telemetry, tracking, control and voice communications) that are not adequately covered by the current regulatory provisions and procedures for terrestrial and space services. Resolution **763 (WRC-15)** further notes that the spectrum requirements for TT&C and voice communications on stations on board sub-orbital vehicles have not been studied.

*SFCG Objective*

SFCG members will continue to monitor the developments of this agenda item in WP 5B for any spectrum requirements identified that could impact space science service operations.

It is important that any regulatory changes associated with this agenda item will not adversely impact the operation of launch vehicles or sounding rockets. Launch vehicle operations during the first minutes of low orbit must not be limited beyond the current regulations.

**Agenda Item 9.1 (Issue 9.1.6)**

Issue 1) in the Annex to Resolution **958 (WRC-15)** Studies concerning Wireless Power Transmission (WPT) for electric vehicles: a) to assess the impact of WPT for electric vehicles on radiocommunication services; b) to study suitable harmonized frequency ranges which would minimize the impact on radiocommunication services from WPT for electrical vehicles.

In the Annex to Resolution **958 (WRC-15)**, WRC-15 identified a number of urgent studies required in preparation for WRC-19, including the study of Wireless Power Transmission for electric vehicles, and specifically, the suitability of proposed harmonized frequency ranges and the impact to radiocommunication services.

*SFCG Objective*

While past work on the topic of WPT for electric vehicles has focused on bands below 400 kHz, and in the 6 765-6 795 kHz band, Resolution **958 (WRC-15)** does not limit the studies to those bands. SFCG should continue to monitor the developments of this agenda item for any spectrum requirements identified that could impact space science services operations.

**Agenda Item 9.1 (Issue 9.1.8)**

Issue 3) in the Annex to Resolution **958 (WRC-15)** Studies on the technical and operational aspects of radio networks and systems, as well as spectrum needed, including possible harmonized use of spectrum to support the

implementation of narrowband and broadband machine-type communication infrastructures, in order to develop Recommendations, Reports and/or Handbooks, as appropriate, and to take appropriate actions within the ITU Radiocommunication Sector (ITU-R) scope of work.

WP 5D has described IMT-2020 as also including massive machine-type communication (mMTC). mMTC is intended to provide connectivity for large numbers of low-cost and low-energy devices in the context of the Internet of Things (IoT). Ultra-reliable and ultra-low latency applications (URLLC) is envisioned to enable real-time control and automation of dynamic processes in various fields, such as industrial process automation and manufacturing, energy distribution, intelligent transport systems and requires communication with very high reliability and availability, as well as very low end-to-end latency.

#### *SFCG Objective:*

SFCG should continue to monitor the developments of this agenda item in WP 5D for any spectrum requirements identified that could impact space science services operations. Although no specific frequency ranges are identified to exclusively provide for the enhanced services, these services may be considered to be within the definition of IMT-2020 and, as such, add to the total amount of spectrum sought under AI 1.13.

**Agenda Item 9.1 (Issue 9.1.9)** Resolution **162 (WRC-15)** - Studies relating to spectrum needs and possible allocation of the frequency band 51.4-52.4 GHz to the fixed-satellite service (Earth-to-space)

Resolution **162 (WRC-15)** states in *considering* d) "that fixed-satellite applications in spectrum above 30 GHz, such as feeder links, should be easier to share with other radiocommunication services than high-density fixed-satellite service (HDFSS) applications".

#### *SFCG Objective*

The SFCG objective is to ensure that any allocation in the band 51.4-52.4 GHz will not adversely impact the EESS (passive) allocation in the bands 52.6-54.25 GHz and 50.2-50.4 GHz (both covered under RR No. **5.340**).

SFCG does not support an allocation until out of band sharing studies have been completed that show the EESS (passive) is not adversely affected and any required revision to Resolution **750 (rev. WRC 15)** is agreed.

#### **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 Objective*

### *General principles*

It is very important to ensure that before any new agenda item is agreed at WRC-19, 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 to be considered for regulatory changes.
4. Preliminary studies on the sharing feasibility in these bands.

Taking into account Resolution **804 (rev. WRC-12)**, SFCG is of the view that adherence to these principles should be made conditional for adoption of any new WRC agenda item. It should be noted that application of these principles by the space sciences community is demonstrated in the WRC-23 preliminary agenda items 2.2 and 2.3 discussed below.

SFCG also supports the inclusion of the following item on the WRC-23 agenda:

**Agenda Item X.X1** to consider a mechanism in RR Appendix **10** to improve the reporting of interference to passive sensors in accordance with Resolution **YYY (WRC-19)**.

Procedures are contained in Section VI of Article **15** to address the actions to be taken when harmful interference occurs between networks authorized by different Administrations. In particular, RR No. **15.27** states full particulars relating to harmful interference shall, whenever possible, be given in the form indicated in RR Appendix **10**. As RR Appendix **10** was designed with terrestrial radiocommunication services in mind, its applicability related to harmful interference detected by EESS (passive) sensors is very limited. Passive sensors have unique characteristics to detect the particulars of the interference using different parameters from those of stations used for radiocommunication. Administrations have approved Recommendation ITU-R RS.2106-0 which provides data fields which should be used to provide information for the detection and resolution of radio frequency interference to Earth exploration-satellite service (passive) sensors. Therefore establishing a mechanism in RR Appendix **10** to improve the reporting of interference to passive sensors would be desirable.

## *SFCG Objective*

The SFCG supports studies examining the possibility of establishing a mechanism in Appendix **10** to report harmful interference to EESS (passive) sensors.

### **Preliminary Agenda WRC-23**

**Agenda Item 2.2** to conduct, and complete in time for WRC-23, studies for a possible new allocation to the Earth exploration-satellite (active) service for spaceborne



radar sounders within the range of frequencies around 45 MHz, taking into account the protection of incumbent services, in accordance with Resolution **656 (WRC-15)**;

The topic of this WRC-23 Agenda item has been on prior SFCG Objectives lists of items of interest for consideration at future World Radio Conferences. The frequency range under consideration has incumbents which include fixed, mobile, and broadcasting services on a primary basis, as well as space research service as a secondary service. Country footnotes for the 40-50 MHz frequency range provide primary allocations for the aeronautical radionavigation and radiolocation services in certain parts of the world.

### *SFCG Objective*

The SFCG supports studies examining the compatibility of the proposed EESS (active) operations with the incumbents. SFCG supports inclusion of this agenda item in the WRC-23 agenda.

**Agenda Item 2.3** in accordance with Resolution **657 (WRC-15)**, to review the results of studies relating to the technical and operational characteristics, spectrum requirements and appropriate radio service designations for space weather sensors, with a view to providing appropriate recognition and protection in the Radio Regulations without placing additional constraints on incumbent services;

For over 60 years, the study of solar-terrestrial relationships has evolved from an exploratory mode into an operational mode. While the observational aspects have evolved from exploratory into operational use, the regulatory underpinning which may be needed to protect space weather observations has not.

### *SFCG Objective*

The SFCG supports studies under this agenda item to determine appropriate recognition and protection for space weather sensors in the Radio Regulations without placing additional constraints on incumbent services. SFCG supports inclusion of this agenda item in the WRC-23 agenda.

**Agenda Item 2.4** study of spectrum needs and possible new allocations to the fixed-satellite service in the frequency band 37.5-39.5 GHz (Earth-to-space), in accordance with Resolution **161 (WRC-15)**;

The fixed-satellite service community has expressed interest in facilitating the delivery of broadband services at frequencies above 30 GHz. The frequency band 37.5-38 GHz is allocated to SRS on a primary basis in the space-to-Earth direction. The frequency band 37.5-39.5 GHz is allocated to EESS on a secondary basis in the space-to-Earth direction. The frequency band 36-37 GHz is allocated on a primary basis to the EESS (passive) and the SRS (passive).

### *SFCG Objective*

SFCG supports the study of this topic. However, SFCG will only support this agenda item being placed on the final WRC-23 agenda, if sufficient consideration of protection of the space science service bands has been made during the WRC-19 study cycle.