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| Summary: | | | | |
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| Proposal: | | | | |
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DRAFT CEPT BRIEF ON AGENDA ITEM 1.7

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).

# ISSUE

Resolution 659 (WRC-15) invites ITU-R

1. to study the spectrum requirements for telemetry, tracking and command in the space operation service for the growing number of non-GSO satellites with short duration missions, taking into account No 1.23;
2. to assess the suitability of existing allocations to the space operation service in the frequency range below 1 GHz, taking into account recognizing a) and current use;
3. if studies of the current allocations to the space operations service indicate that requirements cannot be met under invites ITU-R 1 and 2, to conduct sharing and compatibility studies, and study mitigation techniques to protect the incumbent services, both in-band as well as in adjacent bands, in order to consider possible new allocations or an upgrade of the existing allocations to the space operation service within the frequency ranges 150.05-174 MHz and 400.15-420 MHz.

# Preliminary CEPT position

CEPT supports additional allocations or upgrades of existing allocations to the space operation service for short duration mission satellites provided that:

* Studies of spectrum requirements are based on satellite missions planned and constellation development.
* Studies of spectrum requirements show the need for additional allocations or upgrades of existing allocations.
* Studies show compatibility with existing services.

CEPT supports the use of the current primary allocation to the space operation service in the space-to-Earth direction in the band 137-138 MHz, associated with relevant technical conditions (e.g. pfd limits).

CEPT supports studies for possible modifications to the current regulatory situation including the removal of No 9.21 in the existing allocation to the space operation service in the Earth-to-space direction in the band 148-149.9 MHz.

As an alternative to the band 148-149.9 MHz, CEPT is still investigating a possible 1 MHz allocation to the space-operation service in the Earth-to-space direction limited to non-GSO satellites with short duration missions within the band 403-405 MHz.

For the following bands, considered under this Agenda item, CEPT supports a “No Change”:

* 150.05-174 MHz;
* 400.15-403 MHz;
* 405-420 MHz.

CEPT is of the view that the band 272-273 MHz does not provide a solution to satisfy Agenda item 1.7 and hence supports a “No Change” for this band.

CEPT recognises that studies under this Agenda item will have to take into account the considerations under Agenda item 1.2.

# Background

Agenda Item 1.7 addresses the growing spectrum needs for telemetry, tracking and command for satellites with short duration missions. A short duration mission is a satellite mission for which the associated filing has a period of validity of less than 3 years. These short duration missions are typically composed of small non-GSO satellites which are launched as single units but also as part of larger constellations. The issues concerning filing of small satellites with short operational lifetime and using non-GSO in ITU-R were addressed under WRC-15 Agenda item 9.1.8. The study results on this issue are presented in Report ITU-R SA.2312 and Report ITU-R SA.2348.

Subsequently, Agenda item 1.7 was proposed by CEPT at WRC-15 to cater for the growing number of non-GSO satellites, in particular those referred to as “small” satellites. This growth has been a major contributing factor to the growth in numbers of satellites recently launched in general. Some developers and commercial operators are planning to launch as many as 100 on a single launch for a single application. The applications of these small satellites vary widely, but all of these satellites have one common need which is Telemetry, Tracking and Command (TT&C). Providing for proper TT&C will allow positive satellite control at all times, and, when combined with a ranging capability, may in addition provide for orbit determination, which in turn can aid in the tracking of space objects.

## Consideration of Technical characteristics of Short duration NGSO satellites

ITU Working Party 7B, which is responsible for this agenda item, has developed a Draft New Report ITU-R SA.[SHORT DURATION NGSO – CHARACTERISTICS]. This document contains technical characteristics for telemetry, tracking and command in the space operation service below 1 GHz for non-GSO satellites with short duration missions. The Report provides the characteristics which are necessary in order to perform sharing and compatibility studies.

## Consideration of spectrum requirements

Invites 1 of Resolution 659 (WRC-15) calls for studying the spectrum requirements for telemetry, tracking and command for such satellites, taking into account No 1.23. Simulations have been performed in order to determine the spectrum requirements, based on an assumed number of 300 satellites operating at any given time. The results of these simulations are contained in the Draft New Report ITU-R SA.[SHORT DURATION NGSO - REQUIREMENTS] which has been developed by ITU Working Party 7B. This Report concludes that the spectrum requirements for short duration NGSO systems range from 0.625 MHz to 2.5 MHz in the space-to-Earth direction, and from 0.682 MHz to 0.938 MHz in the Earth-to-space direction, depending on the operational scenario.

## Considerations on the suitability of existing allocations to the space operation service

Invites 2 of Resolution 659 (WRC-15) calls for assessing the suitability of existing allocations to the space operation service in the frequency range below 1 GHz, taking into account that the existing allocations to the space operation service below 1 GHz where No 9.21 applies are not suitable for short duration mission NGSO satellites. This is because the timeline for finding agreement under No 9.21 is usually significantly longer than the time to develop and launch these short duration non-GSO missions. Taking into account that there are no allocations in the Earth-to-space direction below 1 GHz which are not subject to No 9.21, in addition to considering additional allocations to the space operation service in the Earth-to-space direction, consideration is needed on modifying the current regulatory situation in these bands, (i.e. the bands 148-149.9 MHz and 449.75-450.25 MHz).

In the space-to-Earth direction, the bands 272-273 MHz and 401-402 MHz do not meet the spectrum requirements for short duration NGSO satellites for the following reasons:

* The band 272-273 MHz is part of a NATO harmonized band and managed by NATO. CEPT has concluded that this band is not available for short duration missions.
* The band 401-402 MHz is a WMO harmonized band for METSAT EESS and MetAids. This band was studied within ITU Working Party 7B and it was concluded that sharing is not feasible. Therefore, CEPT has concluded that this band is not available for short duration missions.

The band 137-138 MHz is shared with (among others) the meteorological-satellite service. Considering that the use of this band by the meteorological-satellite service is declining, it may be explored whether this band is suitable for use by short duration NGSO satellites. This would then meet at least part of the spectrum requirements in the space-to-Earth direction. From a link budget point of view, tables 6 and 7 from the DNR [SHORT DURATION NGSO – CHARACTERISTICS] shows that short duration-NGSO downlinks in this band are feasible.

## Considerations on new allocations or upgrades of allocations to the space operation service

Invites 3 of Resolution 659 (WRC-15) calls for sharing and compatibility studies as well as studies of mitigation techniques to protect the incumbent services both in-band as well as in adjacent bands in order to consider possible new allocations or an upgrade of existing allocations to the space operation service within the frequency ranges 150.05-174 MHz and 400.15-420 MHz, in case the studies of the current allocations to the space operation service indicate that requirements cannot be met under invites ITU-R 1 and 2.

It should be noted that there are many services allocated in the frequency bands under consideration. In this context, Resolution 659 (WRC-15) recognizes the special requirements for the protection of GMDSS and COSPAS-SARSAT (Resolution 205 (WRC-15)).

ITU Working Party 7B is developing a Preliminary Draft New Report ITU-R SA.[ SHORT DURATION NGSO - SHARING STUDIES] which contains the results of sharing and compatibility studies between short duration non-GSO satellites and incumbent services in the frequency ranges of 150.05-174 MHz and 400.15-420 MHz.

While considering the GMDSS frequency bands 156.000-157.450 MHz, 160.600-160.975 MHz, 161.475-162.050 MHz and 405.9-406.2 MHz it is required to take into account Nos 5.226, 5.267, Article 31, Article 52, Appendix 15, and Appendix 18.

In accordance with No 5.225A the frequency band 154-156 MHz is allocated to the radiolocation service on a primary basis in several countries of Region 1. Studies have shown that the space surveillance radars operating in the frequency band 154-156 MHz can cause unacceptable interference to systems in SOS (Earth-to-space) for operation of non-GSO satellites with short duration missions and it can lead to control loss of such satellites. In addition, it was shown that the space surveillance radars operating in the frequency band 154-156 MHz can suffer unacceptable interference caused by such systems in space-to-Earth direction. Therefore, sharing of SOS systems (Earth-to-space and space-to-Earth) with the radiolocation systems in the frequency band 154-156 MHz is unfeasible.

The studies relating to the frequency bands 399.9-400.05 MHz and 401-403 MHz, if any, will have to take into account the considerations under Agenda item 1.2. In addition, the parts of the frequency bands 150.05-174 MHz and 400.15-420 MHz are considered under the studies on Agenda items 1.11, 1.9.1 and 1.9.2.

The frequency band 150.05-174 MHz is heavily used by public safety agencies, utilities and transportation companies including railway companies. The studies contained in the PDNR ITU-R SA.[SHORT DURATION NGSO – SHARING STUDIES] showed that co-channel sharing of non-GSO satellites with short duration missions downlink with the stations in the land mobile service is unfeasible in the frequency band 150.05-174 MHz due to the excess of the protection threshold value for the land mobile service. In addition, co-channel sharing of non-GSO satellites with short duration missions uplink with the stations in the land mobile service is also unfeasible in the frequency band 150.05-174 MHz due to considerably large separation distances required for protection of the stations in the land mobile service.

The PDNR ITU-R SA.[SHORT DURATION NGSO – SHARING STUDIES] indicates that dynamic studies conducted between SOS uplink signals from Earth stations of NGSO satellites of short duration missions and GSO space stations operating under the MetSat service in the band 401-403 MHz, show that the GSO space station receivers suffer from the harmful interference of about 30 dB above the interference threshold. Therefore, co-channel sharing between Earth-to-space links of non-GSO short duration missions and GSO Data Collection Systems is not feasible in the band 401-403 MHz.

Furthermore, according to the PDNR ITU-R [SHORT DURATION NGSO – SHARING STUDIES], the levels of interference from SOS Space to Earth transmissions to GSO Data collection systems space station receivers in the frequency band 401-403 MHz exceeds the relevant ITU-R interference thresholds by about 10 dB.

Therefore, co-channel sharing is not feasible between short duration NGSO SOS systems (Earth-to-space and space-to-Earth) with GSO MetSat Data collection systems in the frequency band 401-403 MHz.

Some studies presented within CEPT and ITU-R Working Party 7B conclude that MetAids service and Space Operation Service (SOS) (Earth-to-space) and (Space-to-Earth) cannot operate co-frequency. The study mentions that the whole 403-406 MHz band is required on a global basis for MetAids operations (radiosondes, dropsondes and rocketsondes) to ensure relevant operations. These studies conclude that a new space operation service allocation in the band 403-406 MHz for short duration mission satellites is not feasible for both uplink and downlink. Other studies presented within CEPT and ITU Working Party 7B (only considering radiosondes but not MetAids in their entirety) indicate that under certain conditions, such as segmentation of the band 403-406 MHz, there is scope for a new allocation to the space operation service in the frequency band 403-406 MHz in the Earth-to-space direction, coexisting with radiosondes operating under the MetAids service.

Therefore, it can be concluded that co-frequency sharing between the space operation service Earth-to-space and radiosondes and rocketsondes in the band 403-406 MHz is not feasible without application of mitigation techniques, further noting that sharing with dropsondes is not feasible.

A preliminary study performed within CEPT indicates that sharing between non-GSO satellites with short duration missions in the space-to-Earth direction and the Earth-to-space direction with the radio astronomy service in the frequency bands of 150.05-153 MHz and 406.1-410 MHz bands is not feasible.

# List of relevant documents

ITU-Documentation (Recommendations, Reports, other)

* Report ITU-R SA.2271 - Sharing conditions between space research service proximity operations links and fixed and mobile service links in the 410-420 MHz band
* Report ITU-R SA.2312 - Characteristics, definitions and spectrum requirements of nanosatellites and picosatellites, as well as systems composed of such satellites
* Report ITU-R SA.2348 - Current practice and procedures for notifying space networks currently applicable to nanosatellites and picosatellites
* Recommendation ITU-R M.478 – Technical characteristics of equipment and principles governing the allocation of frequency channels between 25 and 3 000 MHz for the FM land mobile service
* Recommendation ITU-R M.1808 - Technical and operational characteristics of conventional and trunked land mobile systems operating in the mobile service allocations below 869 MHz to be used in sharing studies
* Recommendation ITU-R M.489 - Technical characteristics of VHF radiotelephone equipment operating in the maritime mobile service in channels spaced by 25 kHz
* Recommendation ITU-R M.825 - Characteristics of a transponder system using digital selective calling techniques for use with vessel traffic services and ship-to-ship identification
* Recommendation ITU-R M.1371 - Technical characteristics for an automatic identification system using time-division multiple access in the VHF maritime mobile band
* Recommendation ITU-R M.1842 - Characteristics of VHF radio systems and equipment for the exchange of data and electronic mail in the maritime mobile service RR Appendix 18 channels
* Recommendation ITU-R M. 2092 - Technical characteristics for a VHF data exchange system in the VHF maritime mobile band
* Recommendation ITU-R M.1085 - Technical and operational characteristics of wind profiler radars for bands in the vicinity of 400 MHz
* Recommendation ITU-R M.1462 -  Characteristics of and protection criteria for radars operating in the radiolocation service in the frequency range 420-450 MHz
* Recommendation ITU-R M.1802 - Characteristics and protection criteria for radars operating in the radiolocation service in the frequency band 30-300 MHz
* Recommendation ITU-R M.1808 – Technical and operational characteristics of conventional and trunked land mobile systems operating in the mobile service allocations below 869 MHz to be used in sharing studies
* Recommendation ITU-R F.699 – Reference radiation patterns for fixed wireless system antennas for use in coordination studies and interference assessment in the frequency range from 100 MHz to about 70 GHz
* Recommendation ITU-R F.755 – Point-to-multipoint systems in the fixed service
* Recommendation ITU-R F.758 - System parameters and considerations in the development of criteria for sharing or compatibility between digital fixed wireless systems in the fixed service and systems in other services and other sources of interference
* Recommendation ITU-R RA.769-2 – Protection criteria used for radio astronomical measurements
* Recommendation ITU-R RA.1513-1 – Level of data loss to radio astronomy observations and percentage-of-time criteria resulting from degradation by interference for frequency bands allocated to the radio astronomy on a primary basis
* Recommendation ITU-R RS.1165 - Technical characteristics and performance criteria for systems in the meteorological aids service in the 403 MHz and 1 680 MHz bands
* Recommendation ITU-R RS.1263 - Interference criteria for meteorological aids operated in the 400.15-406 MHz and 1 668.4-1 700 MHz bands
* Chairman’s Report WP7B - 7B/326

Annex 3 - Draft CPM text on WRC-19 agenda item 1.7

Annex 15 - Working document towards a preliminary draft new report ITU-R SA.[SHORT DURATION NGSO - SHARING STUDIES] - Studies on the suitability of existing allocations to the space operation service below 1 GHz and additional sharing studies on possible new and/or upgraded allocations

* Document 7/73 - Draft new Report ITU-R SA.[SHORT DURATION NGSO - CHARACTERISTICS] - Technical characteristics for telemetry, tracking and command in the space operation service below 1 GHz for non-GSO satellites with short duration missions
* Document 7/72 - Draft new Report ITU-R SA.[SHORT DURATION NGSO - REQUIREMENTS] - Studies to accommodate spectrum requirements in the space operation service for non-geostationary satellites with short duration missions

CEPT and/or ECC Documentation (Decisions, Recommendations, Reports)

* ECC Decision EEC/DEC/(16)02 – Harmonised technical conditions and frequency bands for the implementation of (BB-PPDR) systems
* ECC Decision EEC/DEC/(08)05 – Harmonisation of frequency bands for the implementation of digital PPDR radio applications in 380-470 MHz range
* ECC Decision EEC/DEC/(06)06 – Narrow Band Digital Land Mobile PMR/PAMR in the 80 MHz, 160 MHz and 400 MHz bands
* ECC Decision EEC/DEC/(04)06 – Wide Band Digital PMR/PAMR in the 400 MHz and 800/900 MHz
* ECC Report 240 – Studies for BB PPDR and other applications in 410-430 and 450-470 MHz and adjacent bands
* ECC Report 218 – Harmonised conditions and spectrum bands for the implementation of future European BB-PPDR systems
* ECC Decision ERC/DEC/(99)17 - Automatic Identification and Surveillance system (AIS) channels in the maritime VHF band
* ECC Decision ECC/DEC/(05)02 - Use of the frequency band 169.4-169.8125 MHz.

EU Documentation (Directives, Decisions, Recommendations, other), if applicable

* N/A

# Actions to be taken

Determine suitability of the existing allocations to the space operation service in the frequency range below 1 GHz.

In the space-to-Earth direction: confirm whether the band 137-138 MHz is suitable and study further the appropriate application of the relevant regulatory provisions.

In the Earth-to-space direction: further study the impact of the removal of No 9.21 in the band 148-149.9 MHz, in particular regarding the protection of the aeronautical-mobile (off-route) service.

Within the band 403-405 MHz:

Continue sharing studies between NGSO short duration satellites operating under the space operation service in the Earth-to-space direction and the meteorological aids service.

Study impact assessment of separation distance to nomadic MetAids systems

Further study adjacent band compatibility

Develop regulatory provisions including a methodology for assessing the coordination zone

Examine possible regulatory actions to satisfy the spectrum requirements of non-GSO satellites with short duration missions

# Relevant information from outside CEPT (examples of these are below)

## European Union (date of proposal)

## Regional telecommunication organisations

APT (March 2018)

Preliminary views:

* ITU-R studies should be continued in accordance with Resolution 659 (WRC-15).
* Protection of existing services is necessary and any new allocations or upgrades of existing allocations to the space operation service should be applied without any constraint to the incumbent services and their future development, both in-band as well as adjacent bands
* The following frequency ranges should not be considered:

Maritime mobile VHF radiocommunication in the frequency ranges 156-157.45 MHz, 160.6-160.975 MHz and 161.475-162.05 MHz, in accordance with RR No. 5.226 and Appendix 18 (Rev. WRC-15).

The frequency range 406-406.1 MHz that is dedicated for satellite emergency position-indicating radio beacons, in accordance with Resolution 205 (Rev. WRC-15); and

Frequency bands used by Global Maritime Distress and Safety System (GMDSS) included in Appendix 15 of RR.

ATU (September 2018)

Method A (No Change)

Arab Group (April 2018)

No change to the RR based on the results of the current sharing studies for the candidate frequency bands, which confirmed that the space operations service and other existing services in that frequency bands could not be shared.

CITEL (July 2018)

Preliminary views

CAN, USA

These administrations support completing sharing and compatibility studies between NGSO satellites with short duration missions and the incumbent services with respect to invites ITU-R 1, 2, and 3 of Resolution 659 (WRC-15), and supports that frequency bands below 1 GHz should be considered for allocation changes only if agreed ITU-R studies demonstrate sharing feasibility. The frequency ranges described for consideration under invites ITU-R 3 overlap with allocations to critical global maritime distress and safety service (GMDSS) frequencies, identified in RR Appendix 15, and centered at 156.3 MHz, 156.525 MHz, 156.65 MHz, 156.8 MHz, 161.975 MHz, and 162.025 MHz, as well as frequencies used for the safety of life COSPAS/SARSAT system in the band 406-406.1 MHz. Therefore, these administrations are of the view that CPM text must exclude the GMDSS frequency bands stated above, the COSPAS-SARSAT frequency range 406-406.1 MHz and the 100 kHz adjacent bands above and below the COSPAS-SARSAT frequency range (Res. 205 (WRC-15)) from consideration for possible new allocations or an upgrade of the existing allocations to the space operation service. Additionally, the frequency ranges for fixed and land mobile (162.0375-173.2 MHz, 173.4-174 MHz, and 406.1-420.0 MHz), meteorological satellite (400.15-403 MHz), earth exploration satellite service (401-403 MHz) and meteorological aids (400.15-406 MHz) services are heavily used, and usage of the existing allocations is expected to increase in the future. These factors must be considered in any sharing and compatibility studies under this agenda item.

These administrations are of the view that a single spacecraft with a lifetime of less than typically three years, where the operator does not launch replenishment or replacement spacecraft is a short duration mission. The operation of multiple spacecraft simultaneously can qualify as short duration if all spacecraft have lifetimes less than typically three years and therefore the frequency and orbital characteristics and capabilities exist for less than 3 years – i.e., no replenishment/replacement. The case of a single (or multiple) spacecraft with a lifetime of less than typically three years, where the operator launches a single (or multiple) replenishment/replacement spacecraft(s) such that the operator has persistent frequency and orbital characteristics and capabilities longer than typically three years, is not considered a short duration mission.

MEX

Mexico supports the continuation of technical, operational, and regulatory studies that make it possible to assess possible new allocations to space operation service on a primary basis for NGSO satellites with short duration missions, considering the due protection of the services in which lifetime safety systems are used.

RCC (October 2018)

* The RCC Administrations consider that spectrum needs for telemetry, tracking and command in the space operation service for non-GSO satellites with short duration missions should be based on real plans for satellite constellation development, taking into account to be able to meet these needs by existing allocations to the space operation service and to the services where a space station is operated in the frequency bands below 1 GHz.
* The RCC Administrations consider that when using existing or new frequency allocations to the space operation service below 1 GHz for the purpose to command non-GSO satellites with short duration missions, the protection shall be ensured to the incumbent services in the same and adjacent frequency bands.
* The RCC Administrations oppose using the frequency bands 150.05-174.0 MHz and 405.9-410 MHz to command non-GSO satellites with short duration missions, since:
* separate parts of the frequency band 150.05-174.0 MHz are actively used within the territory of RCC Administrations for fixed and mobile services;
* frequency band 154-156 MHz is used for the radiolocation service on a primary basis according to No 5.225А in some countries of Region 1;
* separate parts of the frequency band 156-162.05 MHz, as well as frequency band 405.9-406.2 MHz are used by GMDSS;
* frequency bands 150.05-153.0 MHz and 406.1-410.0 MHz are allocated to the radio astronomy service on a primary basis, and the conducted studies have shown the difficulties of sharing between the space operation service and the above mentioned radio services.

## International organisations

IARU (June 2017)

The IARU supports satisfying the spectrum requirements for non-GSO satellites with short duration missions within the existing allocations for the space operation service or the frequency ranges identified in invites ITU-R 3 of Resolution 659 (WRC-15), unless the satellites are amateur satellites as defined in RR Nos. 1.56 and 1.57.

IATA (date of proposal)

ICAO (September 2018)

To oppose consideration of possible allocation to the space operation service in the frequency range 405.9 ‒ 406.2 MHz unless agreed ITU-R studies have proven aviation use of the EPIRBs operating in the frequency band 406 ‒ 406.1 MHz is protected in accordance with Resolution 205 (Rev. WRC-15) and RR No. 5.267.

To oppose any new allocations, or use of existing allocations, to the space operations service in other frequency bands/ranges that could impact aviation systems unless agreed ITU-R studies have proven sharing and compatibility with those systems.

To ensure that any change to the regulatory provisions and spectrum allocations resulting from this agenda item do not preclude the use of any particular allocations for space planes if the radiocommunication service is deemed appropriate for such use.

IMO (July 2017)

The integrity of GMDSS should be protected, and the following frequency bands should not be included in the study:

* 156.000-157.450 MHz, 160.600-160.975 MHz and 161.475-162.050 MHz; and
* 405.900-406.200 MHz.

Taking account of the relevance on the frequency bands with agenda items 1.9.1 and 1.9.2 the coordination with these Agenda items need to be considered.

SFCG (August 2018)

SFCG recognizes the growing number of non-geostationary orbit satellites with short duration (NGSO SD) missions and the associated spectrum requirements resulting from this activity.

SFCG recognises the need for viable solution for NGSO SD missions, however none of the methods contained in draft CPM text (ITU-R WP7B Chairman Report 7B/326 Annex 3) provides a solution that is acceptable on a global level.

SFCG does not support Methods B1/B2 due to the large number of radiosondes that operate in the frequency range 403-406 MHz and their susceptibility to harmful interference by the NGSO SD missions, as evidenced in the Working Party 7B sharing studies.

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 agenda item should assure four key elements:

1. An unambiguous definition must be given about what constitutes a “satellite with short duration mission”:
   1. A system with a period of validity of not more than three years that cannot be extended.
   2. 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.
2. 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 must be consistent with those limits established under WRC-19 agenda item 1.2.
3. In the light of the importance of MetAids operations for the scientific community, used in particular for the calibration of the EESS (passive) measurements, SFCG does not support a potential new allocation to SOS in the the band 403-406 MHz.
4. Any consideration of bands for use under this agenda item must exclude the 406-406.1 MHz COSPAS-SARSAT band as well as appropriate guard bands (see resolves 1, Resolution 205 (WRC-15) and Working Party 7B studies).

EUMETNET (February 2018)

EUMETNET fully endorses the WMO position (see below).

WMO (February 2018)

WMO emphasises that the frequency band 400.15 – 406 MHz is the key band for global radiosonde and DCS operations. Based on studies undertaken in ITU-R, WMO supports a NO Change (NOC) under this agenda item in this frequency band.

Furthermore, based on studies, the existing SOS allocation in 401-402 MHZ is not appropriate for use for satellites with characteristics and mission requirements matching those of non-GSO short duration mission satellites.

## Regional organisations

ESA (August 2018)

See SFCG position

Eurocontrol (November 2018)

To oppose consideration of possible allocation to the space operation service in the frequency range 405.9 ‒ 406.2 MHz unless agreed ITU-R studies have proven aviation use of the EPIRBs operating in the frequency band 406 ‒ 406.1 MHz is protected in accordance with Resolution 205 (Rev. WRC-15) and RR No. 5.267.

To oppose any new allocations, , or use of existing allocations, to the space operations service in other frequency bands/ranges that could impact aviation systems unless agreed ITU-R studies have proven sharing and compatibility with those systems.

To ensure that any change to the regulatory provisions and spectrum allocations resulting from this agenda item do not preclude the use of any particular allocations for space planes if the radiocommunication service is deemed appropriate for such use.

EUMETSAT (October 2016)

EUMETSAT supports the SFCG position on this WRC-19 agenda item and would particularly highlight the need for protecting meteorological satellite (Data Collection System) operations the band 401-403 MHz. It is of paramount importance to preserve the usability of this frequency band 401-403 MHz for DCS systems in the long term."

## OTHER INTERNATIONAL AND REGIONAL ORGANISATIONS

EBU (date of proposal)

GSMA (date of proposal)

CRAF (November 2018)

CRAF supports the protection of existing RAS allocations in the 150.05-153.0 MHz and 406.1-410.0 MHz bands. Studies have shown that in-band sharing between RAS and non-GSO satellites with short duration missions is not possible. Regarding the impact of out-of-band emissions, a guard-band to the edge of the RAS frequency bands may be required to maintain acceptable separation distances.

NATO (November 2018)

NATO military assessment:

From a military perspective, sharing and compatibility studies conducted in accordance with invites 3 of ITU-R Resolution 659 (WRC-15) should take into account the military tactical, mobile, and radiolocation systems operating in and adjacent to the frequency bands now being proposed for Nano/Pico Satellite TT&C, namely: 137-138 MHz, 148-149.9 MHz and 403-406 MHz and that NATO spectrum dependent systems are not adversely affect NATO access or use of its frequencies in or adjacent to these bands.

From a military perspective the use of the existing SOS allocation in 272-273 MHz is not a solution due to the complexity and density of the military usage in that band.

NATO position:

NATO does not oppose a use of a current primary allocation to the space operation service or a new allocation to SOS for short duration NGSO, provided that associated regulatory measures prevent a degradation of existing NATO usage of the spectrum.