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| Subject:  | Draft CEPT Brief on WRC-19 Agenda Item 9.1 issue 9.1.9 |
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| Summary:  |
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| Proposal: |
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1. The following pages are intended to be compiled in one CEPT Brief on AI 9

DRAFT CEPT BRIEF ON AGENDA ITEM 9.1 Issue 9.1.9 - **Resolution 162  (WRC‑15)**

9 to consider and approve the Report of the Director of the Radiocommunication Bureau, in accordance with Article 7 of the Convention:

9.1 on the activities of the Radiocommunication Sector since WRC‑15.

# ISSUE

According to 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)” to conduct:

1. studies considering additional spectrum needs for development of the fixed-satellite service, taking into account the frequency bands currently allocated to the fixed-satellite service, the technical conditions of their use, and the possibility of optimizing the use of these frequency bands with a view to increasing spectrum efficiency;
2. subject to justification resulting from studies conducted under resolves to invite ITU‑R 1, sharing and compatibility studies with existing services, on a primary and secondary basis, including in adjacent bands as appropriate, to determine the suitability, including protection of fixed and mobile services, of new primary allocations to the FSS in the frequency band 51.4-52.4 GHz (Earth-to-space) limited to FSS feeder links for geostationary orbit use, and the possible associated regulatory actions;
3. studies towards possible revision of Resolution 750 (Rev.WRC-12) so that systems operating in the passive frequency band 52.6-54.25 GHz are protected;
4. studies regarding the protection of radio astronomy, as described in recognizing c), including regulatory measures, as appropriate.

# Preliminary CEPT position

Based on the results of studies on additional spectrum needs for development of the fixed-satellite service, in accordance with resolves to invite ITU-R 1 of Resolution 162 (WRC-15), CEPT supports the additional allocation of 1 GHz spectrum in 51.4 – 52.4 GHz band for the uplink GSO FSS feeder links, which allows to increase the throughput of these networks.

CEPT supports the sharing and compatibility studies with existing services for consideration of new primary allocation to the FSS in the frequency band 51.4-52.4 GHz (Earth-to-space) limited to FSS feeder links for geostationary orbit use.

To ensure the protection of the EESS (passive) operating in the band 52.6-54.25 GHz CEPT is actively working to establish the unwanted emission power limits for FSS Earth stations that would operate in the 51.4 - 52.4 GHz. In addition, CEPT supports the approach to assume a 3 dB apportionment of the EESS (passive) protection criterion to take into account the aggregate interference from all the active services allocated in the 51.4-52.4 GHz band. CEPT supports studies regarding the impact on radio astronomy observations in the band 51.4-54.25 GHz.

# Background

High throughput satellites are satellites that have many times the throughput of traditional FSS satellites for the same amount of allocated frequency on orbit. According to Report ITU-R S.2361, these systems aim at reducing the Gbps (Giga Bits per second) cost by optimizing the design of the satellite to take advantage of frequency reuse and spot beams to increase the bit rate throughput for the service area coverage in order to multiply the total amount of spectrum available for the HTS system as compared to a traditional satellite system.

The first studies dealing with such type of systems were held in early 2000. The first generation of High Throughput Satellites (HTS) is already bringing fast internet access directly to households from the geostationary orbit.

The next generation of HTS systems needs to still improve its efficiency over previous ones. So, in order to increase their capacity, additional frequency bands are under study. Initial studies propose to utilize Q and V bands (i.e. 40 and 50 GHz frequency bands). The utilization of Q and V bands is of particular interest for very high speed gateways and it makes more Ka-band available for user terminals.

Latest WP 4A meeting (17 – 27 October 2017, Geneva) received contributions to move forward on the document dealing with FSS spectrum needs in the 51.4 – 52.4 GHz band (Annex 2 to 4A/519). It is expected that during the next WP 4A meeting, the document will be upgraded to DNR.

Progress was also reached on the document on sharing and compatibility studies between FSS and incumbent services (Annex 3 to 4A/519). Sharing studies with incumbent terrestrial services were addressed. Furthermore, a study dealing with the potential IMT-2020 application in the same band was provided. Concerning compatibility with EESS, four studies were submitted and discussed including considerations to protect this passive service. In addition, one study concerning protection of RAS was also included.

WP 4A also agreed on a Working document towards draft CPM text on this subject that is contained in Annex 49 to 4A/519.

CEPT has made progress on the analysis of the unwanted (out of band) emission power limits in adjacent bands above 52.6 GHz that take into account the FSS networks deployment model. The analyses show the relevance of considering the potential co-location of several FSS Earth stations rather than the number of FSS earth stations belonging to the same or different FSS network that are deployed over the measurement area. The approach to take into account the aggregate interference  due to existing terrestrial services allocated in the 51.4-52.6 GHz band is also under discussion; the approach of equally apportion the protection criterion among all the active services in the 51.4 – 52.4 GHz has been considered. It is noted that Fixed-service stations are already subject to limits on unwanted emission power in 52.6 - 54.25 GHz band according to Resolution 750 (WRC-15). Regarding the mobile service, ITU-R Working Parties 5A and 5B have confirmed that there are no ITU-R Recommendations or Reports that include system characteristics and/or protection requirements for systems in the mobile service operating at the frequency band 51.4 – 52.4 GHz. An apportionment of 3 dB of the protection criterion between FS and FSS has therefore been considered.

Dynamic simulations were run to assess the potential for harmful interference from FSS ES (feeder links) on EESS (passive) sensors. They considered that the deployment model and FSS ES characteristics as contained in Annex 18 to 4A/364. Results for the nadir mechanical scan sensors led to unwanted emission limits in the range of –9 dBW/100MHz and –4 dBW/100MHz in the passive band without apportionment for measurement areas located around 50°N latitude. When considering measurement areas around the equator, the unwanted emission limit decreases to -39.2 dBW/100 MHz without apportionment.

For conical scan sensors, the studies showed that interference level is mainly driven by the possibility of main-beam to main-beam coupling events rather than the number of ES deployed. Results for the conical scan sensors led to unwanted emission limits in the range of –23 dBW/100MHz and –18 dBW/100MHz in the passive band without apportionment for measurement areas located around 50°N latitude. All these results were obtained while ensuring geometrical conditions that can lead to main-beam to main-beam coupling events. When considering measurement areas around the equator, the unwanted emission limit increases to -13 dBW/100 MHz without apportionment.

In conclusion, considering a 3 dB apportionment of the protection criterion, a relevant unwanted emission power limit for the protection of EESS (passive) would be in the order of -42.2 dBW/100 MHz.

# List of relevant documents

**ITU-R Documentation**

* Annex 2 to Document 4A/519 – Preliminary draft new Report ITU-R S. [Spectrum\_needs]
* Annex 3 to Document 4A/519 – Working document towards a preliminary draft new Report ITU-R S. [Spectrum\_Sharing]
* Annex 49 to Document 4A/519 – Working document towards draft CPM Text for WRC-19 agenda item 9.1, issue 9.1.9
* Annex 8 to Document 4A/519 – Work plan for WRC-19 Agenda item 9.1 issue 9.1.9
* PT1 SWG 1.13 Annex 8 – Overlap of WRC-19 Agenda items relating to AI 1.13
* Recommendation ITU-R RS.515 – Frequency bands and bandwidths used for satellite passive remote sensing
* Recommendation ITU-R RS.1259 – Feasibility of sharing between space borne passive sensors and the fixed service from 50 to 60 GHz
* Recommendation ITU-R RS.1813 – Reference antenna pattern for passive sensors operating in the Earth exploration-satellite service (passive) to be used in compatibility analyses in the frequency range 1.4-100 GHz
* Recommendation ITU-R RS.1861 – Typical technical and operational characteristics of Earth exploration-satellite service (passive) systems using allocations between 1.4 and 275 GHz
* Recommendation ITU-R RS.2017 – Performance and interference criteria for satellite passive remote sensing
* Recommendation ITU-R RS.2064 – Typical technical and operating characteristics and frequency bands used by space research service (passive) observation systems
* Recommendation ITU-R SM.1542 – The protection of passive services from unwanted emissions
* Recommendation ITU-R SM.1633 – Compatibility analysis between a passive service and an active service allocated in adjacent and nearby bands
* Report ITU-R SM.2092 – Studies related to the impact of active services allocated in adjacent or nearby bands on Earth exploration-satellite service (passive)

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

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

# Actions to be taken

* To continue studies to determine the limits of unwanted emission power from GSO FSS earth stations limited to feeder links operating in the 51.4-52.4 GHz band within the EESS (passive band) 52.6-54.25 GHz band.
* To prepare proposals on revision of Resolution 750 (Rev.WRC-15), based on studies of aggregate interference effects from  active services in the frequency band 51.4-52.4 GHz.
* To coordinate the activity with ECC PT1
* To prepare proposals to the draft CPM Report
* To develop an ECP

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

## European Union (date of proposal)

## Regional telecommunication organisations

APT (July, 2017)

APT Members support ITU-R studies relating to spectrum needs, sharing and compatibility between fixed-satellite service in the frequency band 51.4-52.4 GHz and other co-frequency, and adjacent band services in accordance with Resolution 162 (WRC-15).

APT Members are of the view that consideration of an allocation to the fixed-satellite service (Earth-to-space) in the frequency band 51.4-52.4 GHz limited to feeder links for geostationary satellite orbit use is subject to satisfactory outcomes of ITU-R studies related to spectrum needs and compatibility with existing services allocated to the same and adjacent bands.

ATU (September, 2017)

The APM19-2 agreed to:

1. Support studies on evaluation of additional spectrum needs for development of the FSS in accordance with resolves to invite ITU-R 1 of Resolution 162 (WRC 15).

2. Support sharing and compatibility studies with existing services for the consideration of a new primary allocation to the FSS in the frequency band 51.4-52.4 GHz (Earth-to-space) limited to FSS feeder links for geostationary orbit use as long as the protection of existing services are ensured.

3. Recall that 52% of responding countries to the ATU Questionnaire on the possible allocation of the band to FSS stated that they would support the allocation.

4. Invite administrations to consider developments under AI 1.13 due to potential overlaps of the bands.Arab Group (April, 2017)

Follow up current studies on this item. Ensure the protection of existing services, especially the fixed and mobile services that may be used extensively in Arab states. Consult with satellite operators with respect to their needs of spectrum in the frequency range 52.4 - 51.4 GHz. Consultation with concerned groups in ASMG on the proposed allocation of this band for IMT.

CITEL (December, 2017)

Preliminary Views

USA, Canada

The United States and Canada support the study of all aspects of spectrum needs for the development of the fixed-satellite service under Resolves 1 of Resolution 162. The United States and Canada further support the study as appropriate of possible primary allocation to the FSS of the frequency band 51.4-52.4 GHz (Earth-to-space), limited to GSO FSS feeder links, under the terms of Resolution 162 (WRC-15) to ensure compatibility with existing services, including adjacent bands as appropriate. Such studies should determine the suitability, including protection of fixed and mobile services, of a new primary allocation to the FSS in the frequency band 51.4-52.4 GHz (Earth-to-space), limited to FSS feeder links for geostationary orbit use, and the possible associated regulatory actions based on the results of these studies.

RCC (September, 2017)

The RCC Administrations are in favour of justification of additional spectrum needs for the development of the fixed-satellite service in the frequency bands above 50 GHz, taking into account frequency bands currently allocated to this service in the ranges above 30 GHz as well as the possibility to optimize their use based on the technology of FSS satellites with multiple-beam antennas and frequency reuse.

The RCC Administrations consider that the technical conditions and regulatory provisions, which are subject to the ITU-R studies, for use of new primary allocations to the FSS (Earth-to-space) in the 51.4-52.4 GHz band, limited to GSO FSS feeder links, shall ensure protection of existing services and systems in the considered and adjacent frequency bands and development of possible related regulatory measures, including revision of Resolution 750 (Rev. WRC-15).

## International organisations

IATA (date of proposal)

ICAO (date of proposal)

IMO (date of proposal)

NATO (July 2017)

This NATO military assessment summary is a common military assessment of the NATO Nations on the potential impacts and benefits of Agenda Item 9.1 Issue 9.1.9. It does not constitute a common position of the NATO Nations.

The frequency band 51.4 - 52.4 GHz is not listed in the NJFA and limited military usage is identified for this band. The aimed allocation would achieve balance between uplink and downlink which should improve FSS usage efficiency that could possibly benefit to military operations in the future.

SFCG, ESA (June, 2016)

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 band 52.6-54.25 GHz (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.

WMO and EUMETNET (November 2016)

EUMETNET:

No opposition to the possible allocation of the frequency band 51.4-52.4 GHz to the FSS (E-s) provided that protection of EESS (passive) and ground-based radiometers is ensured

## Regional organisations

Eurocontrol (date of proposal)

## OTHER INTERNATIONAL AND REGIONAL ORGANISATIONS

EBU (date of proposal)

GSMA (date of proposal)

CRAF (date of proposal)