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***Communications for all in East Africa***

**3rd EACO WRC-23 preparatory meeting (17th-19th/08/2021)**

CHAPTER 3 (Science issues)

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| **Input Document**  |

**Agenda Item 1.14**

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| ***Part A: Description*** |
| to review and consider possible adjustments of the existing or possible new primary frequency allocations to EESS (passive) in the frequency range 231.5-252 GHz, to ensure alignment with more up-to-date remote-sensing observation requirements, in accordance with **Resolution 662 (WRC-19).****Resolution 662 (WRC-19):** The World Radiocommunication Conference (Sharm el-Sheikh, 2019) resolved to invite the ITU Radiocommunication Sector to review the existing primary allocations to the EESS (passive) in the frequency range 231.5-252 GHz in order to analyse if these allocations are aligned with the observation requirements of passive microwave sensors. |
| ***Part B: Key Elements – the notables*** |
| Passive microwave remote sensing instruments has the ability to measure ice clouds, based on the microwave frequencies being employed. The currently deployed microwave sensors typically operate in frequencies less than 200 GHz and are sensitive only to thick ice because the interaction of millimeter-wave radiation with cloud particles is not very strong. This interaction improves with increasing frequency and at intermediate frequencies in the frequency band 231.5 – 252 GHz the sensitivity to ice clouds is significantly more than in lower frequencies. The measurement of ice particles is used to measure the hydrometeor properties of cirrus clouds, higher altitude convective and anvil clouds. Ice clouds have important effects on the Earth’s climate and hydrological cycle by affecting precipitation, atmospheric structure and cloud processes. The main objective in measuring ice clouds is to improve the current Numerical Weather Prediction (NWP) Models.Furthermore, various portions of this frequency range play an important role in the measurement of chemical processes and compounds within Earth’s atmosphere such as Nitric acid (HNO3) which is a primary reservoir for reactive nitrogen, serving as a key component to upper tropospheric processes that maintain ozone abundances and clouds.The allocation to the Earth exploration-satellite service (EESS) (passive) for the use of passive microwave remote sensing system were agreed at WRC-2000, under agenda item 1.16 relating to Resolution 723 (WRC-97). The development in science and technology for passive microwave sensor measurements have evolved over the last 20 years and it is appropriate to ensure that frequency allocations to the EESS (passive) agreed in 2000 correspond to up-to-date for the observation requirements for passive microwave sensing.However, a number of services are allocated in the band 231.5 – 252 GHz, any change to the EESS (passive) allocation to ensure the alignment with more up-to-date remote-sensing observational requirements should take into account the results of ITU-R studies while also ensuring that no undue constraints should be imposed on existing service services.  |
| ***Part C: Current Status of Band*** |
| **ITU-R Table of Frequency Allocation**Figure 1: The current and proposed allocations in the band 231.5 – 252 GHz.* The frequency band under consideration is 231.5 – 252 GHz, however, passive sensors systems under development plan to operate in the frequency range 239 – 248 GHz, given the specific characteristics of this frequency band for ice-cloud analysis.

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| 231.5-232 FIXED MOBILE Radiolocation |
| 232-235 FIXED FIXED-SATELLITE (space-to-Earth) MOBILE Radiolocation |
| 235-238 EARTH EXPLORATION-SATELLITE (passive) FIXED-SATELLITE (space-to-Earth) SPACE RESEARCH (passive) 5.563A 5.563B |
| 238-240 FIXED FIXED-SATELLITE (space-to-Earth) MOBILE RADIOLOCATION RADIONAVIGATION RADIONAVIGATION-SATELLITE |
| 240-241 FIXED MOBILE RADIOLOCATION |
| 241-248 RADIO ASTRONOMY RADIOLOCATION Amateur Amateur-satellite 5.138 5.149 |
| 248-250 AMATEUR AMATEUR-SATELLITE Radio astronomy 5.149 |
| 250-252 EARTH EXPLORATION-SATELLITE (passive) RADIO ASTRONOMY SPACE RESEARCH (passive) 5.340 5.563A |

Figure 2: ITU-R Table of frequency allocation.**African Spectrum Allocation Plan (AfriSAP)*** Frequency allocation is exactly the same as in the ITU-R Table of frequency allocation in the frequency band 231.5 – 252 GHz.
* SRDs applications are the currently identified typical applications in the band 241 – 248, while radio astronomy observations are identified in the band 241 – 252 GHz.
* No other typical applications are identified in the band 231.5 – 252 GHz
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| ***Part D: Conclusion of the results of studies, if any*** |
| There are currently no studies developed under this agenda item. In the meeting of September 2020, WP 7C developed the first draft for a reference document called “Elements related to WRC-23 agenda item 1.14” (Document 7C/105 Annex21). This provided the scientific background and description of this particular application of EESS(passive). The document has been updated to incorporate input from USA, ESA and EUMETSAT in the meeting of April 2021. The Working Parties (WP 5A, 5B and 5C) provided liaisons to WP7C informing it that there are currently no information regarding and characteristics of active services available.Working Party 4C also provided a liaison informing WP7C that presently no ITU-R documents that describe the RNSS or MSS technical or operational characteristics for the frequency band 231.5 – 252 GHz. WP 7D provided a liaison informing WP 7C of the availability of primary RAS allocations in the band considered and that the threshold levels of interference detrimental to radio astronomy observations can be taken Recommendation ITU-R RA.769.More updates and contributions from contributing working groups are expected in the WP7C meeting of Sept 2021. |
| ***Part E: Options and Associated Implications*** |
| *N/A* |
| ***Part F: Proposed EACO Common View and/or Position*** |
|  Support the ITU-R studies to review frequency allocation and consider some adjustment/extension of the EESS (passive) allocation to accommodate up-to-date observation requirements of passive microwave sensing, taking into account the benefits of this application of passive microwave sensing. However, the effect on the primary services in the frequency range 231.5 – 252 GHz would have to be studied to ensure protection and that no undue constraints on the following services and affected bands: * **Radionavigation services** in the band 238 – 240 GHz.
* **Radionavigation satellites** services in the band 238 – 240 GHz.
* **Radiolocation services** in the band 238 – 240 GHz and 241 – 248 GHz.
* **Fixed services** in the band 238 – 241 GHz.
* **Radio Astronomy** in the band 241 – 248 and 248 - 252 GHz.
* **Fixed Satellite services** in the band 232 – 240 GHz.
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| ***Part G: Recommendations and Way Forward*** |
|  *EACO invites member states to:*1. *Continue active participation in ongoing studies with the intent of positively influencing the outcome of the studies.*
2. *Follow-up the studies under this agenda item to review the existing primary allocation to the EESS (passive) in the frequency range 231.5 – 252 GHz in order to analyse if these allocations are aligned with the observation requirements of passive microwave sensors.*
3. *Ensure the any adjustment to EESS (passive) satisfies the protection criteria of RAS services in the bands 241 – 248 GHz and 248 – 252 GHz, as described in the Recommendation ITU-R RA. 769.*
4. *Study the impact that any change to the EESS (passive) allocation in the band 231.5 – 252 GHz might have on any other primary allocation in the band 231.5 – 252 GHz.*
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| ***Part H: Regional Groups Position*** |
| ***RCC*** | *The RCC Administrations support the development of conditions for spectrum sharing between EESS (passive) and existing and future systems of active services both in the frequency band 231.5-252 GHz and in the adjacent frequency bands on the basis of compatibility studies between passive services in that frequency band.* |
| ***CEPT*** | *CEPT supports to cover relevant requirements of passive microwave sensor measurements within the frequency range 231.5-252 GHz with frequency allocations to EESS (passive) without unduly constraining the other primary services currently allocated in this frequency range.**In line with the scientific observation requirements identified so far, CEPT supports the assessment of the frequency bands 239.2-242.2 GHz and 244.2-247.2 GHz for a possible primary allocation to the EESS (passive), including the relevant sharing and compatibility studies with the services to which these and the adjacent bands are already allocated.* |
| ***CITEL*** | *CITEL administration supports studies to review the existing EESS(passive) allocations and consider possible adjustments to existing allocations or new allocations to the EESS(passive) within the frequency range 231.5 - 252 GHz in accordance with Resolution 662 (WRC 19) without unduly constraining the primary services currently allocated* |
| ***ASMG*** | *ASMG administration support the preliminary studies of the Earth Exploration (Passive) satellite service in the band 231.5 252 GHz without imposing any restrictions on existing services.* |
| ***APT*** | *APT Members support the consideration of possible adjustments of the existing or possible new primary frequency allocations to EESS (passive) in the frequency range 231.5-252 GHz in accordance with Resolution 662 (WRC-19) subject to the outcome of the study results.* *Any changes to the EESS (passive) allocations in the frequency range 231.5-252 GHz shall not adversely affect the operation of other primary services allocated in this frequency band* |