

PTD-1**Virtual meeting, 16-18 February 2021****Date issued: 9 February 2021****Source: CRAF****Subject: RAS Spectrum needs within the frequency band 470-960 MHz in Region 1**

Group membership required to read? (Y/N)

N

Summary:

WRC-15, through Resolution 235 (WRC-15), resolved to invite ITU-R, after the 2019 World Radiocommunication Conference and in time for the 2023 World Radiocommunication Conference to:

1. *review the spectrum use and study the spectrum needs of existing services within the frequency band 470-960 MHz in Region 1, in particular the spectrum requirements of the broadcasting and mobile, except aeronautical mobile, services, taking into account the relevant ITU Radiocommunication Sector (ITU-R) studies, Recommendations and Reports;*

In Region 1, the 470-694 MHz band is currently allocated to the broadcasting service on a primary basis. Several other services such as Mobile and fixed services are also allocated in portions of the band on a secondary basis. In the European part of Region 1, radio Astronomy has a secondary allocation in the band 608-614 MHz according to the footnote 5.306. Whereas in the African Broadcasting Area of Region 1 (roughly all of Africa and part of the Middle East), the band 606-614 MHz has a primary allocation, according to 5.304. According to footnote 5.149, administrations are urged to take all practicable steps to protect the radio astronomy service in the band 608-614 MHz from harmful interference when making assignments to stations of other services. In Europe there are some national agreements to protect as much as possible the RAS in the TV channel 608-614 MHz (channel #38) for example by not emitting in the channel in some parts of the country.

In Region 2, the band 608-614 MHz is allocated to radio astronomy on a primary basis due to its importance for US observatories.

During its first meeting in October 2020, Task group TG 6/1 divided the work under this agenda item into three working groups. Working group 1 scope is the spectrum use and needs of all existing services in the band 470-960 MHz. WG1 has identified RAS as an existing service in the band and a liaison statement was sent to WP7D for information on RAS spectrum needs. The next WP7D meeting in April will be the last meeting before the deadline set for receiving spectrum needs from the existing services defined by WG1 on May 15 2021. The next TG 6/1 meeting is scheduled in June 2021.

IMT is a candidate for an allocation in the 470-694 MHz band in region 1. According to ITU report ITU-R RA.2332-0 on the compatibility and sharing studies between the radio astronomy service and IMT systems in the frequency band 608-614 MHz, coexistence between RAS and IMT in this band will require stringent protection measures. In particular, in-band sharing would only be possible with separation distances of more

than 1000 km, which is not applicable in a densely populated environment that we find in CEPT countries. Furthermore, even for adjacent band or spurious domain IMT emissions, relatively large coordination zones with radii in excess of 100 km are needed. Therefore, CRAF is of the view that any identification for IMT in this band must be associated with an upgrade of the RAS allocation to a primary status.

Proposal:

invites Group to

- In order to strengthen the protection of the band in region 1 for radio astronomical observations, consider an upgrade for the secondary band 608–614 MHz to a primary allocation similar to the situation in region 2 and the African Broadcasting Area in region 1, should IMT be identified for an allocation in the 470-694 MHz band.
- Endorse a reply LS from WP7D to TG 6/1 during their next meeting in April 2021 requesting the upgrade of RAS to a primary service in the band 608-614 MHz.

Background:

Radio astronomy gives considerable importance to the 608–614 MHz band. Without it, there would be a large gap between the 410 MHz and 1 400 MHz RAS allocations, in one of the most interesting parts of the spectrum. The band is also widely used for continuum VLBI observations.

The band is, for example, important for the following types of observations:

- Pulsar timekeeping. The optimal frequency range for pulsar observations is 0.4–2.0 GHz, because their radio emission is strongest at these frequencies. As pulsar observations are time consuming, observations at much higher frequencies would be much less efficient. The 610 MHz band is also first to enable better dispersion measure (DM) estimation. The DM uncertainties dominate the noise that limits the pulsar timing array sensitivity to nanohertz gravitational wave background. Furthermore, astronomers explore the recently discovered phenomenon of fast radio bursts (FRB) at frequencies below 1 GHz. Currently, at least two different classes are known to exist - the repeating and non-repeating bursts and they also differ in the spectral properties. Since the origins for FRBs is still unclear, investigating the repeating FRBs in the 610 MHz band is a well-motivated work.
- VLBI can perform high spatial resolution measurements of polarized sources, which are very bright at these frequencies. This enables a unique opportunity to investigate the active galactic nuclei of other galaxies and to study the physics of these extreme objects in particular the black holes, which are embedded. Furthermore, VLBI observations also allow to measure continental drifts or Earth parameters such as Earth rotation, which is important for a multitude of other scientific fields, e.g., Earthquake monitoring, space navigation, or high-precision geodesy.
- High-redshifted spectral lines of neutral atomic hydrogen or the hydroxyl molecule lie in and around the 610 MHz band, being produced in the young universe at cosmic times, when star formation was much more active than today.
- Observations of linearly polarized radio emissions to study the physical circumstances under which the radiation is generated. For an unambiguous determination of the change of polarization angle, observations need to be done using three frequencies (326 MHz, 610 MHz, 1.42 GHz)