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| Plenary |  Doc. ECC(18)021 Rev1 |
| 47th Meeting |  |
| Lisbon, 27 February – 2 March 18  |  |
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| Date issued: 07 February 2018 |
| Source: France, Germany, Switzerland, United Kingdom |  |
| Subject:  |  |
| NGroup membership required to read? (Y/N) |
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Summary:

This meeting of ECC is being asked to adopt for public consultation the draft ECC Decision on 24.25-27.5 GHz and the draft CEPT Report in response to the Commission mandate to CEPT on 5G pioneer bands. There are a number of open issues in the least restrictive technical conditions for this frequency band but one of the most critical is the unwanted emission limit in the 23.6-24 GHz passive band.

The administrations having signed this contribution consider that, given the importance of the 26 GHz band in the European 5G roadmap, it is essential that European countries reach a common view regarding the issue of the limits for BS and UE unwanted emission falling into the passive band 23.6-24 GHz.

These administrations believe that the overall objective is that unwanted emission limits should ensure protection of EESS sensors while avoiding undue constraints on 5G BS and UE stations.

In order to ensure protection of EESS, the unwanted emission limits in 23.6-24 GHz need to be included in the ECC Decision and they should also be provided to the EC in the CEPT Report.

Discussions in ECC/PT1 and TG5/1 have mainly focused on the issue of the applicable model to use for Active Antenna System (AAS) for studies on limits on unwanted emission in the 23.6-24 GHz. ITU-R Recommendation M.2101 states that: “*In an adjacent frequency band situation with IMT as the interfering system, the antenna pattern for the unwanted emission can be assumed to have a similar antenna pattern as a single antenna element. For emissions of the IMT system inside the channel bandwidth the composite antenna pattern needs to be simulated*.“ The signing administrations recognize that:

* the 23.6-24 GHz is close to the operational AAS band, so that the AAS will remain beamformed to a large extent
* as shown by some measurements and simulations in this frequency range, the ITU-R Recommendation M.2101 model applicable to beamforming gain underestimates, in the band 23.6-24 GHz, the sidelobes levels in the EESS direction. For an 8x8 array, the sidelobes closest to the main beam, M.2101 appears to give a reasonable match to the measurements and simulations but sidelobes further from the main beam are underestimated.

During the TG5/1 meeting, it also appeared that, when using the beamformed M.2101 model showing high variability in the calculated gain in the sidelobes, the statistical nature of the cumulative interference needed to be taken into account, i.e. the 99th percentile interference being about 6 dB above the median value and the 90th percentile being about 4 dB above. Unwanted emission limits based on the median interference levels may not be sufficient to ensure the protection of EESS passive services..

**Way forward for public consultation**

ECC PT1 and ITU-R TG 5/1 have not been able to conclude on a value for the unwanted emission limit in 23.6-24 GHz, and so the draft deliverables are presented with TBD as the limit. It is important for the public consultation to seek comments on a single value for the limits for BS and UE unwanted emission falling into the passive band 23.6-24 GHz. In order to derive these limits, the signing administrations propose as a provisional approach to consider the interference value calculated for the [90/99]th percentile of the cumulative interference distribution derived using the beamformed M.2101 pattern. It has to be understood that the [90/99]th percentile criteria is not endorsed per se but this value is considered to balance the fact that the pattern used may underestimate the radiation pattern at the sidelobes on average.

In preparation of the next ECC/PT1 meeting and TG5/1, the signing administrations wish to work together on possible alternative or updated antenna model which will take into account beamforming and a more realistic representation of the sidelobes levels. In this respect, the availability of measurement results of 3D pattern of real AASs would be very useful to assess the adequacy of any model.

Two other parameters are also important in the calculation:

* Apportionment of the interference between different services. A value of 3 dB has been assumed in calculating the provisional emission limits. This is consistent with the value proposed by ITU-R WP7C. However, further analysis on this is needed to verify this value as it is not clear that other services adjacent to the 23.6-24.0 GHz band will contribute equally to the interference seen by EESS receivers.
* Accounting for multichannel operations (only one single channel interference was used in most simulations). ECC/PT1 had previously considered an additional 2 dB margin to be appropriate.

Based on these assumptions and on the simulations presented in TG5/1 (see in particular doc.235 and doc.284), the unwanted emission limits would provisionally be:

* For BS : [-42/44] dBW/200 MHz
* For UE : [-38/40] dBW/200 MHz

 It is understood that the level of interference from BS and MS could be balanced in a different way (e.g. increasing BS level and decreasing MS level while keeping the same overall interference). This question should be raised during the public consultation.

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Proposal:

1. To include in the ECC decision sent into public consultation, the following limits for BS and UE unwanted emission falling into the passive band 23.6-24 GHz, with values to remain in square brackets:
* For BS : [-42/44] dBW/200 MHz
* For UE : [-38/40] dBW/200 MHz
1. To explain in the public consultation document that there are some ongoing activities to work on a possible alternative or updated antenna model which will take into account beamforming as well as more realistic sidelobes levels of AAS and that industry is invited to provide measurement results of AAS 3D pattern.
2. To task ECC/PT1 to work out such an alternative or updated antenna model, to review the proposed values accordingly and to contribute to TG5/1 on this issue

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Background:

The ECC Decision on the harmonisation of the 26 GHz band for 5G is submitted to the ECC meeting by the ECC/PT1 for sending into public consultation.

One of the most intensive discussion at the ECC/PT1 was the limit for the BS and UE unwanted emission falling into the passive band 23.6-24 GHz. The sensitivity and the importance of EESS satellite observations as well as the challenge for active antenna system (AAS) to filter out unwanted emission has resulted in ECC/PT1 not being able to come up with a proposed value to ECC.

During ITU-R TG5/1 meeting, additional discussions took place which facilitated common understanding between parties involved in the discussion, which led to this joint contribution to ECC.