**3GPP TGS-RAN WG4 Meeting #100e draft R4-2114752
Electronic Meeting, Aug. 16 – 27, 2021**

**Title:** LS on lower 6GHz NR unlicensed operation for Europe

**Response to:**

**Release:** Rel-17

**Work Item:** NR\_6GHz\_unlic\_EU

**Source:** TSG RAN WG4

**To:** TSG RAN

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**Attachments:** None

# 1 Overall description

According to the WID for the Introduction of lower 6GHz NR unlicensed operation for Europe RAN4 is tasked to [1]:

* Depending on the details of the European regulatory requirements, determine whether they are best handled by relevant updates (if any) of band n96 or whether a new band is needed.
	+ If a new band is needed, determine the band plan for unlicensed operation in the range 5945-6425 MHz

Therefor the two options list below have been discussed:

* **Option 1:** Re-using already defined band n96, for the frequency range 5945 MHz to 6425 MHz
	+ FFS if additional notes and/or clarifications are needed. Regional specific requirements to be included in relevant specifications.
* **Option 2:** Defining a new band n[xx], for the frequency range 5945 MHz to 6425 MHz
	+ On top of specific requirements provided by ECC, the new band shall reuse requirements already defined for n96, where possible.

During the RAN4#98, RAN4#98bis and RAN4#99 the two options have been discussed without any resolution. As a result, the matter was raised to RAN discussion at RAN#92. At RAN#92 no conclusion was achieved and RAN4 was tasked to compare option 1 (Re-using already defined band n96) and option 2 (Defining a new band n[xx]) regarding requirements and signalling at RAN4#100 meeting and to bring a comparison back to RAN#93e. The decision between the two options was then to take place at RAN#93. This LS conveys the requested comparison and related observations.

**RAN4 has agreed that:**

* Options 1 and 2 are technically possible and can support unlicensed operation for Europe in the frequency range 5945 MHz to 6425 MHz.
* Both options can re-use band n98 UE hardware; however, these options will have different radio blocking performance above 6425 MHz .
* The necessary changes in UE specification 38.101-1 and BS specification 38.104 are detailed in tables 1 and 2 below.

From the tables below it is evident that the main difference between the options is not the specification of a band in the 3GPP specifications but rather issues related to regulatory compliance with the requisite European harmonised standards and prevention of unauthorized use in 6425-7125 MHz. The main difference between the two band options are BS and UE blocking requirements and BS out-of-band emissions applicability in the 6425-7125 MHz

Tentative agreement: Specify 6GHz spectrum for UE operating in Europe band by following both Option 1 and Option2.

**Table 1 – Comparison of UE specification (TS 38.101-1) impact for the two options**

|  |  |  |  |
| --- | --- | --- | --- |
| **Affected clause** | **Requirement** | **Option 1****Re-using already defined band n96** | **Option 2****Defining a new band n[xx],** |
| 5.2 | Operating bands | No changes neededExisting band n96 is re-usedFUL\_low: Limited to 5945 MHzFUL\_high: Limited to 6424 MHzFDL\_low: Limited to 5945 MHzFDL\_high: Limited to 6424 MHz | Changes needed A new band [nXX] is addedFUL\_low: Defined as 5945 MHzFUL\_high: Defined as 6424 MHzFDL\_low: Defined as 5945 MHzFDL\_high: Defined as 6424 MHz |
| 5.2A.1, 5.2A.2 | Intra-band CA and inter-band CA | no major benefits for either option |
|  |  |
| 5.3.5 | UE channel bandwidth per operating band | No changes neededExisting channel bandwidth will be re-used. Including 100MHz CBW. | Reuse of band n96Duplicating and re-using of the n96 channel bandwidth for the new band in the bandwidth table. Including 100MHz CBW. |
| 5.4.2.3 | Channel raster | No changes neededExisting channel rasters are re-used (with a NOTE if needed limiting the range for the EU/CEPT region) | Reuse of band n96Duplicating and re-using of the n96 channel rasters, that correspond to the 5945-6425MHz range |
| 5.4.3.3 | Sync raster | No changes neededExisting sync rasters are re-used (with a NOTE if needed limiting the range for the EU/CEPT region) | Reuse of band n96Duplicating and re-using of the n96 sync rasters corresponding to the 5945-6425MHz range |
| 5.5A.1 | Configurations for intra-band contiguous CA | no major benefits for either option |
|  | . |
| 5.5A.3.1 | Configurations for inter-band CA (two bands) | no major benefits for either option |
|  |  |
| 6.2F.1 | UE maximum output power | Specification changesNew NS value(s) corresponding to the EU/CEPT regulations | Specification changesNew NS value(s) corresponding to the EU/CEPT regulations |
| Several companies expressed concerns with having multiple NS values defined for different regions and stated that European regulatory conformance cannot be met with this approach. However, other companies do not share these concerns and note that other bands defined within the 3GPP specification also have multiple NSs for different regions.  |
| 6.2F.2 | UE maximum output power reduction | No changes needed | No changes needed |
| 6.2F.3 | UE additional maximum output power reduction | Changes needed New NS value(s) added but only applicable for the 5945-6425 MHz range restricting operation within this frequency range.  | Changes needed New NS value(s) for the new band |
| 7.3F | Reference sensitivity | No changes neededBand n96 requirements are re-used.Including REFSENS exceptions for band combinations in 38.101-1 and 38.101-3 | Reuse of band n96 Duplicating and re-using of band n96 requirements.Including REFSENS exceptions for band combinations in 38.101-1 and 38.101-3 |
| 7.6F.2 | In-band blocking characteristics | FFS |
|  |
| 7.6F.3 | Out-of-band Blocking characteristics | FFS |
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**Table 2– Comparison of BS specification (TS 38.104) impact for the two options**

|  |  |  |  |
| --- | --- | --- | --- |
| **Affected clause** | **Requirement** | **Option 1****Re-using band n96** | **Option 2****Defining a new band n[xx]** |
| 5.2 | Operating band | No changes neededExisting band n96 is re-usedFUL\_low: Limited to 5945 MHzFUL\_high: Limited to 6424 MHzFDL\_low: Limited to 5945 MHzFDL\_high: Limited to 6424 MHz | Changes needed A new band [nXX] is addedFUL\_low: Defined as 5945 MHzFUL\_high: Defined as 6424 MHzFDL\_low: Defined as 5945 MHzFDL\_high: Defined as 6424 MHz |
| 5.4.2.3 | Channel raster entries for each operating band | No changes neededExisting channel bandwidth will be re-used. Including 100MHz CBW. | Changes needed Duplicating and re-using of the n96 channel bandwidth for the new band in the bandwidth table. Including 100MHz CBW. |
| 5.4.3.3  | Synchronization raster entries for each operating band | No changes needed Existing channel rasters are re-used (with a NOTE if needed limiting the range for the EU/CEPT region) | Changes needed Duplicating and re-using of the n96 channel rasters, that correspond to the 5945-6425MHz range |
| 6.6.1 | General | FFS if the definition of Foube have to be clarified for the range 5945-6425 MHz when operated in EU | FFS if Foube needs redefining for new band |
| 6.6.3.2 | ACLR | No changes needed | Changes needed Duplicating and re-using from n96 and add the new band number |
| 6.6.5.2  | UEM | FFS | FFS |
| 7.2.2  | REFSENS | No changes needed | Changes needed Duplicating and re-using from n96 and add the new band number |
| 7.3.2  | Dynamic range | No changes needed | Changes needed Duplicating and re-using from n96 and add the new band number |
| 7.4.1.2 | ACS requirement | No changes needed | Changes needed Duplicating and re-using from n96 and add the new band number |
| 7.4.2 | In-band blocking | Changes needed Modify the requirement for 5945-6425 so note is not based on operating band but on restricted frequency range (and potentially a modified Foube) when operating in EUFFS  | Changes needed Clarify Foube requirements for new band with the range 5945-6425 MHz |
| 7.5.2 | Out-of-band blocking | Changes needed Modify the requirement for 5945-6425 so note is not based on operating band but on restricted frequency range (and potentially a modified Foobb) when operating in EUFFS  | Changes needed Clarify Foobb requirements for new band with the range 5945-6425 MHz |
| 7.5.3 | Co-location minimum requirements | Changes needed Paragraph 4 and Note 3 would have to be modified to take into account the range 5945-6425 MHz when operated in EU (not the operating band as the exclusions would only exist for the allocated sub-band). | No change needed |
| 7.6.2 | Receiver spurious emissions | Changes needed Modify the requirement for 5945-6425 so note is not based on operating band but on restricted frequency range (and potentially a modified Foube) when operating in EU | No change needed |
| 7.7.2 | Intermodulation requirement | No changes needed | Changes needed Duplicating and re-using from n96 and add the new band number |
| 7.8.2 | ICS requirement | No changes needed | Changes needed Duplicating and re-using from n96 and add the new band number |

# 2 Actions

**To 3GPP RAN**

**ACTION:** RAN4 respectfully asks RAN to take the information detailed above into account.

# 3 Dates of next TSG RAN WG4 meetings

TSG RAN WG4 Meeting #101-e November 1 – 12, 2021 E-meeting

TSG RAN WG4 Meeting #102-e February 21 – 25, 2022 TBC

# 4 References

1. RP-210762, Introduction of lower 6GHz NR unlicensed operation for Europe, WID