**3GPP TGS-RAN WG4 Meeting #100e R4-21xxxxx
Electronic Meeting, Aug. 16 – 27, 2021**

**Title:** Draft 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.

*Note that selecting any of the options above shall not in any way interfere with regulatory activities and timelines for the 6 GHz range. (As per RAN agreement)*

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:**

* Both options are technically feasible and can be chosen to support unlicensed operation for Europe in the frequency range 5945 MHz to 6425 MHz.
* The same hardware of UE as for n96 may be reused on the frequency range 5945MHz to 6425MHz no matter whether to define a new band or define new NS for the existing n96.
* The needed specification changes in UE specification 38.101-1 and BS specification 38.104 is detailed in table 1 and 2 below.

**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 | Existing 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 | 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 | Band combinations with n96 will become available for the EU/CEPT region | Potential duplicating and re-using of band combinations.NOTE: As there are regional bands, not all the band combinations might be duplicated. |
| 5.3.5 | UE channel bandwidth per operating band | Existing channel bandwidth will be re-used. Including 100MHz CBW. | Duplicating 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 | Existing channel rasters are re-used (with a NOTE if needed limiting the range for the EU/CEPT region) | Duplicating and re-using of the n96 channel rasters, that correspond to the 5945-6425MHz range |
| 5.4.3.3 | Sync raster | Existing sync rasters are re-used (with a NOTE if needed limiting the range for the EU/CEPT region) | Duplicating and re-using of the n96 sync rasters corresponding to the 5945-6425MHz range |
| 5.5A.1 | Configurations for intra-band contiguous CA | Band n96 intra-band CA configurations will be re-used, including being standardised NR-U UL CA. | Duplicating and re-using of n96 intra-band CA configurations, including being standardised NR-U UL CA. |
| 5.5A.3.1 | Configurations for inter-band CA (two bands) | Band n96 intra-band CA configurations will be re-used.Also for EN-DC in TS 38.101-3.  | Duplicating and re-using of n96 intra-band CA configurations.Also for EN-DC in TS 38.101-3. |
| 6.2F.1 | UE maximum output power | New NS value(s) corresponding to the EU/CEPT regulations | New NS value(s) corresponding to the EU/CEPT regulations |
| 6.2F.2 | UE maximum output power reduction | No changes needed | No changes needed |
| 6.2F.3 | UE additional maximum output power reduction | New NS value(s) added but only applicable for the 5945-6425 MHz range restricting operation within this frequency range.  | New NS value(s) for the new band |
| 7.3F | Reference sensitivity | Band n96 requirements are re-used.Including REFSENS exceptions for band combinations in 38.101-1 and 38.101-3 | Duplicating and re-using of band n96 requirements.Including REFSENS exceptions for band combinations in 38.101-1 and 38.101-3 |
| 7.6F | Blocking characteristics | Band n96 in-band blocking requirement applies in 5925-7125  | Out-of-band blocking requirements in in 5925-7125 MHz |

**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 | Existing 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 | 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 | Existing channel bandwidth will be re-used. Including 100MHz CBW. | 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 | Existing channel rasters are re-used (with a NOTE if needed limiting the range for the EU/CEPT region) | 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 with a note for the range 5945-6425 MHz when operated in EU | Redefine Fobue requirements for new band |
| 6.6.3.2 | ACLR | No change needed | Duplicating and re-using from n96 and add the new band number |
| 6.6.5.2  | UEM | Add a note to n96 restricting it for the range 5945-6425 MHz when operated in EU. | Duplicating and re-using from n96 and add the new band number |
| 7.2.2  | REFSENS | No change needed | Duplicating and re-using from n96 and add the new band number |
| 7.3.2  | Dynamic range | No change needed | Duplicating and re-using from n96 and add the new band number |
| 7.4.1.2 | ACS requirement | No change needed | Duplicating and re-using from n96 and add the new band number |
| 7.4.2 | In-band blocking | FFS if the definition of Foube have to be clarified with a note for the range 5945-6425 MHz when operated in EU | Re-using Foube requirements for new band with the the range 5945-6425 MHz |
| 7.5.2 | Out-of-band blocking | FFS if the definition of Foobb have to be clarified with a note for the range 5945-6425 MHz when operated in EU | Re-using Foobb requirements for new band with the the range 5945-6425 MHz |
| 7.5.3 | Co-location minimum requirements | Note 3 would have to be modified to 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. | Duplicating and re-using from n96 and add the new band number |
| 7.6.2 | Receiver spurious emissions | A note is needed to clarify that the exclusions for the range 5945-6425 MHz when operated in EU does not apply in the 5925-7125 range. | Duplicating and re-using from n96 and add the new band number |
| 7.7.2 | Intermodulation requirement | No change needed | Duplicating and re-using from n96 and add the new band number |
| 7.8.2 | ICS requirement | No change 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