**3GPP TSG-RAN WG4 Meeting # 111 R4-2408914**

**Fukuoka, Japan, 20th – 24th May, 2024**

**Agenda item:** 5.4

**Source:** Moderator (Meta Ireland)

**Title:** Topic summary for [111][103] R18\_UERF\_maintenance\_Part1

**Document for:** Information

# Introduction

*Briefly introduce background, the scope of the topic summary discussion (e.g. list of treated agenda items) and provide some guidelines for the topic discussion lists if necessary.*

In the [111][103] R18\_UERF\_maintanance\_Part1, RAN4 treat the contributions for Rel-18 maintenance for LTE and NR which were already closed WIs in Rel-18.

Candidate targets are listed as follows.

* Topic #1: Maintenance of Spectrum related WIs in Rel-18 (Agenda Item 5.1)
  + Sub-Topic 1-1: Missing MSD requirements in TS38.101-1 (2 Tdoc)
  + Sub-Topic 1-2: Clarification of overlapping DL/SUL bands (1 Tdoc)
  + Sub-Topic 1-3: New FDD band for (L+S band) for IoT\_NTN operation (2 Tdoc)
  + Sub-Topic 1-4: NR-U 6GHz unlicensed bands (2 Tdoc)
  + Sub-Topic 1-5: NR\_n109 UE channel BW corrections (3 Tdoc)
  + Sub-Topic 1-6: LTE-CA\_R18 band combinations (2 Tdoc)
  + Sub-Topic 1-7: High power UE related Corrections (2 Tdoc)
  + Sub-Topic 1-8: Other NR CA/DC CRs for corrections (3 Tdocs)
* Topic #2: Maintenance of Non-spectrum related WIs in Rel-18 (Agenda Item 5.2.x)
  + Sub-Topic 2-1: NR Channel raster enhancement for TN (6 Tdocs)
  + Sub-Topic 2-2: NR Channel raster enhancement for NTN (2 Tdocs)
  + Sub-Topic 2-3: NR channel raster capability for RedCap (4 Tdocs)
  + Sub-Topic 2-4: LTE NB-IoT UE RF requirements (1 Tdoc)
  + Sub-Topic 2-5: NR Support for UAV (2 Tdocs)
  + Sub-Topic 2-6: Enhanced LTE Support for UAV (2 Tdocs)

# Topic #1: Maintenance of Spectrum related WIs in Rel-18

*Main technical topic overview. The structure can be done based on sub-agenda basis.*

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| [R4-2408847](https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_111/Docs/R4-2408847.zip) (Draft CR) | Qualcomm France, SKW | Title: Draft CR Adding missing MSD for CA\_n25A-n66A PC2  **This is a Draft CR (Cat. F) for TS38.101-1 in Rel-18**  Reason: Cross-band MSD for CA\_n25A-n66A is missing.  **Proposal:** In Table 7.3A.6-1a for PC2 aggressor, add the cross-band MSD in both n25 reception and n66 reception for CA\_n25A-n66A according to singl Tx and Dual Tx in TS38.101-1. |
| [R4-2408848](https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_111/Docs/R4-2408848.zip) (Draft CR) | Qualcomm France, SKW | Title: Draft CR Adding missing MSD for CA\_n2A-n66A and for CA\_n25A-n66A PC3  **This is a Draft CR (Cat. F) for TS38.101-1 in Rel-18**  Reason: Cross-band MSD for CA\_n2A-n66A and CA\_n25A-n66A PC3 are missing.  **Proposal:** In Table 7.3A.6-1 for PC3 aggressor, add the cross-band MSD in each n2 reception of CA\_n2A-n66A case and n25 reception of CA\_n25A-n66A case in TS38.101-1. |
| [R4-2408851](https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_111/Docs/R4-2408851.zip) (Draft CR) | Qualcomm France | Title: Draft CR on clarification on overlapping DL/SUL bands  **This is a Draft CR (Cat. F) for TS38.101-1 in Rel-18**  Reason: n28-n83, n1-n84, and n8-n81 are overlapping bands, so it is important to clarify that channel bandwidths are symmetrical unless otherwise specified, and in addtion for n28-n83 that channels are confined within lowest 30MHz or withing highest 30MHz.  **Proposal:** In Table 5.2C-4 in SUL band combination with inter-band CA, add Note3 and Note 4 as follow for the combination with n28-n83 in TS38.101-1. |
| [R4-2407314](https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_111/Docs/R4-2407314.zip)  (Formal CR: resubmission of endorsed CR) | MTK | Title: (IoT\_NTN\_FDD\_LS\_band) CR to 36.307: Release independent for IoT-NTN requirements (Rel-18)  **This is a CR (Cat. F) for TS36.307 v18.4.0 in Rel-18**  Reason: This formal CR is for resubmission of the endorsed draft CR (R4-2404782).  **Proposal:** In Table 3A.4-1, Sentence of “with bands specified in Rel-18 36.102” is added in TS36.307. |
| [R4-2407315](https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_111/Docs/R4-2407315.zip)  (Formal CR) | MTK | Title: (IoT\_NTN\_FDD\_LS\_band) (Rel-18)  **This is a CR (Cat. F) for TS36.764 v18.1.0 in Rel-18**  Reason: In the clause 2 reference, the reference TS needs to be added. Secondly, reference tables need to be correctly referred. Finally, the ambiguous content of FDD band B254 (L+S band) needs to be modified.  **Proposal:** Add reference [3] TS36.101 and [4] TS36.102 in clause 2. Also add the explicit references in UE coexistence Table 6.2.1.2.1-1 for LTE band 254 in TS36.764.  **Table 6.2.1.2.1-1: Requirements for spurious emissions for UE co-existence**   |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **E-UTRA Band** | **Spurious emission** | | | | | | | | | **Protected band** | **Frequency range (MHz)** | | | **Maximum Level (dBm)** | **MBW (MHz)** | **NOTE** | | 254 | E-UTRA Band 2, 4, 5, 12, 13, 14, 17, 24, 25, 26, 29, 30, 31, 41, 48, 54, 66, 70, 71, 72, 85, 87, 88, 103  NR Band n1, n3, n7, n8, n18, n20, n28, n34, n38, n39, n40, n50, n51, n53, n54, n65, n67, n74, n75, n76, n77, n78, n90, n91, n92, n93, n94, n105 | FDL\_low | - | FDL\_high | -50 | 1 |  | | NR Band n79 | FDL\_low | - | FDL\_high | -50 | 1 | 2 | | NOTE 1: FDL\_low and FDL\_high refer to each E-UTRA frequency band specified in Table 5.1.1-1  NOTE 2: As exceptions, measurements with a level up to the applicable requirements defined in TS 36.102 [4] Table 6.5A.4.2-2 are permitted for each assigned E-UTRA carrier used in the measurement due to 2nd, 3rd, 4th [or 5th] harmonic spurious emissions. Due to spreading of the harmonic emission the exception is also allowed for the first 1 MHz frequency range immediately outside the harmonic emission on both sides of the harmonic emission. This results in an overall exception interval centred at the harmonic emission of (2MHz + N x LCRB x 180kHz), where N is 2, 3, 4, [5] for the 2nd, 3rd, 4th [or 5th] harmonic respectively. The exception is allowed if the measurement bandwidth (MBW) totally or partially overlaps the overall exception interval. | | | | | | | | |   6.2.1.3 Configured TX power  It is agreed the current TS 36.102 [4] requirements can be re-used for band B254.  6.2.1.4 Power control  It is agreed the current TS 36.102 [4] requirements can be re-used for band B254.  6.2.1.5 Frequency error  It is agreed the current TS 36.102 [4] requirements can be re-used for band B254.  6.2.1.6 Transmit modulation quality  It is agreed the current TS 36.102 [4] requirements can be re-used for band B254. |
| [R4-2407046](https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_111/Docs/R4-2407046.zip) (Discussion) | Apple | Title: Adding support for the 6GHz unlicensed band in Taiwan  **This is a discussion paper to present new regulatory requirements from Taiwan for the unlicensed operation in the lower 6GHz band. And according to the presented analysis, Taiwanese regulations can be already supported with the existing NS flags not requiring any changes to the core specifications.**  The Taiwan’s rules for the lower 6GHz unlicensed band are aligned with the existing CEPT regulations covered in ETSI EN 383 687  Proposal: Introduce support for the lower 6GHz unlicensed band in Taiwan by re-using existing band n102, and EU/CEPT flags NS\_58 (LPI) and NS\_64 (VLP). |
| [R4-2407047](https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_111/Docs/R4-2407047.zip)  (Formal CR) | Apple | Title: in TR38.849 v18.3.0  **This is a Draft CR (Cat. F) for TR38.849 in Rel-18**  Reason: Taiwanese NCC updated its regulations for low power radio frequency equipment, which in particular covered unlicensed operation in 5925-6425MHz frequency range. Since Taiwanese regulations are aligned with EU/CEPT regulations captured in ETSI EN 383 687, existing NS flags can be re-used for Taiwan.  **Proposal:** In Table 6.1.1-1, Taiwan is added to Region 3 countries with the same NS flags as for EU/CEPT in TR38.849. |
| [R4-2407081](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2407081.zip)  (Formal CR: resubmission of endorsed CR) | Apple | Title: CR to 38.101-1 on corrections for n109 UE channel BW table misalignment in Table 5.3.5-1  **This is a Formal CR (Cat. F) for TS38.101-1 v18.5.0 in Rel-18**  Reason: This is a resubmission of the endorsed draft CR R4-2404179 in RAN4 #110bis meeting.  **Proposal:** Align n109 UE channel bandwidths with the table header row in Table 5.3.5-1. |
| [R4-2408789](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2408789.zip)  (Formal CR) | ZTE, Sanechips | Title: (NR\_FDD\_ULn28\_DLn75\_n76) CR for TS 38.101-1: Correct channel bandwidths and SCS supported by band n109  **This is a Formal CR (Cat. F) for TS38.101-1 v18.5.0 in Rel-18**  The CR is exactly same as Apple endorsed CR. So the formal CR of Apple’s resubmission CR will be treated. **R4-2408789 will be not treated.** |
| [R4-2408790](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2408790.zip)  (Formal CR) | ZTE, Sanechips | Title: (NR\_FDD\_ULn28\_DLn75\_n76) CR for TS 38.104: Correct channel bandwidths and SCS supported by band n109  **This is a Formal CR (Cat. F) for TS38.104 v18.5.0 in Rel-18**  Reason: The channel bandwidths and SCS supported by band n109 doesn’t align with the table header as treated in TS38.101-1.  **Proposal:** Correct channel bandwidths and SCS supported by band n109 to align with the table header. |
| [R4-2408727](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2408727.zip)  (Formal CR) | Nokia | Title: CR into 36.101 Correction to band combination tables  **This is a Formal CR (Cat. F) for TS36.101 v18.5.0 in Rel-18**  Reason: Some UL CA configurations are separated with a comma while most are not. Consistency is missing.  **Proposal:** In clause 5.6A.1, the commas are removed in the band combination tables. |
| [R4-2408728](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2408728.zip)  (Formal CR) | Nokia | Title: CR for 36.101 removal of illegal characters from CA acronyms  **This is a Formal CR (Cat. F) for TS36.101 v18.5.0 in Rel-18**  Reason: There are illegal characters on CA acronyms, such as “&” and “-“-.  **Proposal:** In clause 5.6A.1, some illegal characters removed in the band combination tables. |
| [R4-2408803](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2408803.zip)  (Formal CR) | Qualcomm | Title: [HPUE\_FR1\_DC\_LTE\_NR\_R18-Core] CR to TS 38.101-3: Corrections to HPUE band combinations  **This is a Formal CR (Cat. F) for TS38.101-3 v18.5.1 in Rel-18**  Reason: : In 38.101-1 for CA, superscript is added only for UL configuration, while in 38.101-3 for DC superscript is added for both UL and DL configuration. However, there are some combinations in TS 38.101-3 where the supercript exist only in UL or only in DL configuration, leaving it ambiguous whether HPUE is applicable or not. This CR corrects those ambiguities and adds or removes superscripts as needed.  **Proposal:** update the UL configuration for High power DC UE in TS38.101-3 a follow   1. DC\_1A\_n3A-n79A: WID RP-240241 states DC-1A\_n3A-n79A has only HPUE UL config DC\_1A-n79A and it is completed with CR in R4-2321701. Therefore superscript (Note 14) is added to DC\_1A\_n79A. 2. DC\_1A-19A\_n78(2A): completed in CR R4-2309387, but superscript for DL configuration has not been implemented, therefore superscrupt (Note 14) is addeed to DL configuration. 3. DC\_2A-2A-13A\_n77A: higher order DL configuration DC\_2A-2A-13A\_n77C includes note for PC2 support and MSD tables for PC2 include DC\_2A-2A-13A\_n77A. Therefore superscript (Note 14) is added to the DL configuration 4. DC\_2A-48A-48A\_n77A and DC\_2A-48A-48A-48A\_n77A: PC2 UL for DC\_2A\_n77A is supported with single 48A carrier. 48A\_n77A UL is not specified even for 2-carrier case. Therefore 48A\_n77A UL is removed and PC2 superscript (Note 14) added to DC\_2A\_n77A UL 5. DC\_2A-5A-48A\_n77A: 3-band fallbacks have PC2 enabled, therefore PC2 indication is added to UL configurations DC\_2A\_n77A and DC\_5A\_n77A 6. DC\_2A-13A\_n5A-n77A: Based on fallback combinations PC2 indication is added to DC\_2A-n77A and DC\_13A-n77A UL but not for DC\_2A\_n5A UL 7. DC\_5A-48A-66A\_n77A: Based on fallback combinations PC2 UL is added to DC\_5A\_n77A and DC\_66A\_n77A UL configurations 8. DC\_7A-8A-20A\_n28A: DL configuration indicates support for PC2 but the only UL configurations DC\_7A\_n28A does not support PC2 in fallback configurations, therefore PC2 indication is removed from the DL configuration. 9. DC\_13A-66A\_n5A-n77A: Based on fallback combinations PC2 indication is added to UL configurations DC\_13A\_n77A and DC\_66A\_n77A, but not for DC\_66A\_n5A UL |
| [R4-2408809](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2408809.zip)  (Discussion)   * It was treated in [111][112]HPUE\_Basket\_inter-CA\_SUL | Qualcomm | Title: [HPUE\_FR1\_TDD\_NR\_CADC\_SUL\_R18] HPUE indications for higher order DL configurations  **This is a discussion paper for HP UE indication for high order DL configuration.**  **Proposal 1:** Enable HPUE support of additional interband CA DL carriers and intra-band DL CA carriers for cases where fallback combinations requiring technical analysis have been specified for the same power class.  **Proposal 2:** Specify the HPUE support of additional higher order DL CA configurations in general clause, and consider the following text as starting point for the specification:  **Proposal 3:** RAN4 shall keep continuing the work to add explicit indications of HPUE support independent of these proposals being agreed. |
| [R4-2408729](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2408729.zip)  (Formal CR) | Nokia | Title: CR for 38.101-1 Correction of cell issues  **This is a Formal CR (Cat. F) for TS38.101-1 v18.5.0 in Rel-18**  Reason: Some UL configurations are in different cells while in most cases these are in same cell. This creates issues for machine reading for automation.  **Proposal:** Combine all UL configurations into first cell in clause 5.5A. |
| [R4-2408730](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2408730.zip)  (Formal CR) | Nokia | Title: CR into 38.101-3 Correction to band combination tables  **This is a Formal CR (Cat. F) for TS38.101-3 v18.5.1 in Rel-18**  Reason: Some UL CA configurations are separated with a comma while most are not. Consistency is missing.  **Proposal:** Commas removed in clause 5.5B.4 in TS38.101-3. |
| [R4-2409240](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2409240.zip)  (Formal CR) | Verizon, Ericssson and Samsung | Title: TS 38.101-3: CR for correction of band n77 CBW  **This is a Formal CR (Cat. F) for TS38.101-3 v18.5.1 in Rel-18**  Reason: The 5MHz channel bandwidth is an invalid one for the band n77 .  **Proposal:** Change the 5MHz CBW to 10MHz for the band n77 to align on the definition of the band for the following configuration.   * DC\_2A-13A\_n77A * DC\_2A-13A\_n77C * DC\_2A-2A-13A\_n77A * DC\_2A-2A-13A\_n77C |

## Open issues summary

*Before Meeting, moderators shall summarize list of open issues, candidate options and possible WF (if applicable) based on companies’ contributions.*

### Sub-topic 1-1

*Sub-topic description:* **Missing MSD requirements in TS38.101-1**

*Open issues and candidate options before meeting:*

**Issue 1-1-1:** Draft CR ([R4-2408847](https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_111/Docs/R4-2408847.zip)) for Missing MSD for PC2 CA\_n25A-n66A in TS38.101-1

* Proposals
  + Option 1: In Table 7.3A.6-1a for PC2 aggressor, add the cross-band MSD in both n25 reception case and n66 reception case for CA\_n25A-n66A according to singl Tx and Dual Tx in TS38.101-1.
  + Option 2: TBA.
* Recommended WF
  + Need to revise for [R4-2408847](https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_111/Docs/R4-2408847.zip). HW has concerned the adding the Note 4 and Note 5 to distinguish single Tx and dual Tx for MSD requirements.

🡪Just add the missing MSD requirements for PC2 CA\_n25A-n66A in Table Table 7.3A.6-1a in TS38.101-1.

**Issue 1-1-2:** Draft CR ([R4-2408848](https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_111/Docs/R4-2408848.zip)) for Missing MSD for CA\_n2A-n66A and for CA\_n25A-n66A PC3 in TS38.101-1

* Proposals
  + Option 1: In Table 7.3A.6-1 for PC3 aggressor, add the cross-band MSD in each n2 reception of CA\_n2A-n66A case and n25 reception of CA\_n25A-n66A case in TS38.101-1.
  + Option 2: TBA.
* Recommended WF
  + There was no flagging for [R4-2408848](https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_111/Docs/R4-2408848.zip). Draft CR can be endorsed.

### Sub-topic 1-2

*Sub-topic description:* **Clarification of overlapping DL/SUL bands**

*Open issues and candidate options before meeting:*

**Issue 1-2-1:** Draft CR ([R4-2408851](https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_111/Docs/R4-2408851.zip)) for clarification on overlapping DL/SUL bands in TS38.101-1

* Proposals
  + Option 1: In Table 5.2C-4 in SUL band combination with inter-band CA, add Note3 and Note 4 as follow for the combination with n28-n83 in TS38.101-1.
    - NOTE 3: Unless otherwise stated, the UL/DL channel bandwidths for overlapping SUL/DL bands are symmetrical.
    - NOTE 4: Channels for both n28 and n83 are confined either within lowest 30MHz or highest 30MHz of the band.
  + Option 2: TBA.
* Recommended WF
  + Draft CR [R4-2408851](https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_111/Docs/R4-2408851.zip) was not pursed.
  + Flagging by Huawei. Huawei concerned to add Note 3 and Note 4 in Table 5.2C-4 in SUL band combination with inter-band CA. Note 3 will be restricted the NW deployements and Note 4 will be raised the limitation of only allowing of dual duplexer usage in n28.

### Sub-topic 1-3

*Sub-topic description:* **New FDD band for (L+S band) for IoT\_NTN operation**

*Open issues and candidate options before meeting:*

**Issue 1-3-1:** Formal CR ([R4-2407314](https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_111/Docs/R4-2407314.zip)) to TS36.307: Release independent for IoT-NTN requirements

* Proposals
  + Option 1: Resubmission of endorsed CR (R4-2404782) to add Sentence of “with bands specified in Rel-18 36.102” in TS36.307
  + Option 2: TBA.
* Recommended WF
  + Need to revise for the formal CR [R4-2407314](https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_111/Docs/R4-2407314.zip). Proponent company MTK has flagged to update the additional changes in TS 36.307 Rel-18 V18.4.0 clause 1. Scope as follows:

The present document specifies requirements for Rel-1~~7~~**8** UEs supporting release independent features like:

-    additional E-UTRA operating frequency bands on top of Rel-1~~7~~**8** of TS 36.101 [2], **TS 36.102 [6]** and TS 36.133 [3];

-    additional E-UTRA CA configurations (intra-band/inter-band) on top of Rel-1~~7~~**8** of TS 36.101 [2] and TS 36.133 [3];

-    additional operating bands and/or CA configurations for specific features (like UE category 0, M1, NB1);

-    other release independent features (like 4Rx antenna port, high speed scenario, 8Rx antenna port, NB-IoT or eMTC operation over NTN).

**Issue 1-3-2:** Formal CR ([R4-2407315](https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_111/Docs/R4-2407315.zip)) to TR36.764 for IoT-NTN UE RF requirements

* Proposals
  + Option 1: Add reference [3] TS36.101 and [4] TS36.102 in clause 2. Also add the explicit references in UE coexistence Table 6.2.1.2.1-1 for LTE band 254 in TR36.764.
  + Option 2: TBA.
* Recommended WF
  + Need to revise for the formal CR [R4-2407315](https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_111/Docs/R4-2407315.zip). CHTTL flagging that it is not necessary to add “B” in LTE band 254 in the clause from 6.2.1.3 to 6.2.1.6.

### Sub-topic 1-4

*Sub-topic description:* **NR-U 6GHz unlicensed bands**

*Open issues and candidate options before meeting:*

**Issue 1-4-1:** Adding 6GHz unlicensed band n102 in Taiwan

* Proposals
  + Option 1: Introduce support for the lower 6GHz unlicensed band in Taiwan by re-using existing band n102, and EU/CEPT flags NS\_58 (LPI) and NS\_64 (VLP)
  + Option 2: TBA.
* Recommended WF
  + Option 1 is agreeable.

**Issue 1-4-2:** Formal CR ([R4-2407047](https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_111/Docs/R4-2407315.zip)) to TR38.849 for supporting lower 6GHz unlicensed band in Taiwan

* Proposals
  + Option 1: In Table 6.1.1-1, “Taiwan” is added to Region 3 countries with the same NS flags as for EU/CEPT in TR38.849.
  + Option 2: TBA.
* Recommended WF
  + Option1. Formal CR ([R4-2407047](https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_111/Docs/R4-2407315.zip)) can be agreeable since there was no flagging.

### Sub-topic 1-5

*Sub-topic description:* **n109 UE channel BW corrections**

*Open issues and candidate options before meeting:*

**Issue 1-5-1:** Formal CR ([R4-2407081](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2407081.zip)) in TS38.101-1 to correct the n109 UE channel BWs in Table 5.3.5-1

* Proposals
  + Option 1: Resubmission CR based on endorsed CR ([R4-2404179](https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_110bis/Docs/R4-2404179.zip)), RAN4 can agree to update the supporting CBWs for NR band n109 in Table 5.3.5-1 in TS38.101-1.
  + Option 2: TBA.
* Recommended WF
  + Option 1. Formal CR ([R4-2407081](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2407081.zip), Apple) can be agreeable since there was no flagging.
  + CR **R4-2408789** from ZTE has same contents as the Apple CR, So the CR (8789) **will be not treated.**

**Issue 1-5-2:** Formal CR ([R4-2408790](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2408790.zip)) in TS38.104 to correct the n109 UE channel BWs in Table 5.3.5-1

* Proposals
  + Option 1: Based on formal CR ([R4-2408790](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2408790.zip)), RAN4 can agree to update the supporting CBWs for NR band n109 in Table 5.3.5-1 in TS38.104.
  + Option 2: TBA.
* Recommended WF
  + Option 1. Formal CR ([R4-2408790](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2408790.zip), ZTE, Sanechips) can be agreeable since there was no flagging.

### Sub-topic 1-6

*Sub-topic description*: **LTE-CA\_R18 band combinations**

*Open issues and candidate options before meeting:*

**Issue 1-6-1:** Formal CR ([R4-2408727](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2408727.zip)) into TS36.101 Correction to band combination tables

* Proposals
  + Option 1: Based on CR ([R4-2408727](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2408727.zip)), RAN4 update the editorial corrections in clause 5.6A.1, the commas are removed in those band combination tables.
  + Option 2: TBA.
* Recommended WF
  + Option 1. Formal CR ([R4-2408727](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2408727.zip), Nokia) can be agreeable since there was no flagging.

**Issue 1-6-2:** Formal CR ([R4-2408728](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2408728.zip)) into TS36.101 for removal of illegal characters from CA acronyms

* Proposals
  + Option 1: Based on CR ([R4-2408728](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2408728.zip)), RAN4 update the editorial corrections in clause 5.6A.1 to remove the illegal characters from CA acronyms.
  + Option 2: TBA.
* Recommended WF
  + Option 1. Formal CR ([R4-2408728](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2408728.zip), Nokia) can be agreeable since there was no flagging.

### Sub-topic 1-7

*Sub-topic description*: **High power UE related Corrections**

*Open issues and candidate options before meeting:*

**Issue 1-7-1**: Formal CR to TS 38.101-3: Corrections to update and remove superscript for HPUE band combinations

* Proposals
  + Option 1: Based on CR([R4-2408803](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2408803.zip)), RAN4 can update the contents of superscript for HPUE band combinations in TS38.101-3.
    - There are 9 corrections for adding/removal the superscript of HP UE band combinations
  + Option 2: TBA
* Recommended WF
  + Option 1. Formal CR ([R4-2408803](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2408803.zip), Qualcomm) can be agreeable since there was no flagging.

**Issue 1-7-2**: From the discussion paper ([R4-2408809](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2408809.zip), QC), RAN4 need to decide how to support the high order fallback combinations for HPUE band combinations

* Proposals
  + Option 1: Based on discussion paper ([R4-2408809](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2408809.zip)), RAN4 can support proposal 1.
    - Proposal 1: Enable HPUE support of additional inter-band CA DL carriers and intra-band DL CA carriers for cases where fallback combinations requiring technical analysis have been specified for the same power class.
  + Option 2: TBA
* Recommended WF
  + The discussion paper was covered in [111][112]HPUE\_Basket\_inter-CA\_SUL not to duplicate topic in both thread. Not need further discussion.

**Issue 1-7-3**: From the discussion paper ([R4-2408809](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2408809.zip), QC), RAN4 need to decide how to specify the HPUE support of additional higher order DL CA configurations in general clause 5.5A.3.0 for HPUE band combinations

* Proposals
  + Option 1: Based on discussion paper ([R4-2408809](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2408809.zip)), RAN4 can support proposal 2.
    - Proposal 2: Specify the HPUE support of additional higher order DL CA configurations in general clause, and consider the following text as starting point for the specification:
      * “For inter-band CA configurations with 1 UL band and 3 or more DL bands, PC2 and/or PC1.5 can be supported even when no applicability note is present, if all fallback CA configurations with 1 UL band and 2 DL bands have been specified and the corresponding PC2 and/or PC1.5 applicability notes are present.
      * For inter-band CA configurations with 2 UL bands and 4 or more DL bands, PC2 can be supported even when no applicability note is present, if all fallback CA configurations with 2 UL bands and 3 DL bands have been specified and the corresponding PC2 applicability notes are present.
      * If an inter-band CA configuration with PC2 and/or PC1.5 support has been specified and enabled with an applicability note, the same power class can be supported for specified configurations with same UL and DL bands but with additional intra-band DL carriers even when PC2 and/or PC1.5 applicability note is not present for these higher order DL configurations.”
  + Option 2: TBA
* Recommended WF
  + The discussion paper was covered in [111][112]HPUE\_Basket\_inter-CA\_SUL not to duplicate topic in both thread. Not need further discussion.

**Issue 1-7-4**: From the discussion paper ([R4-2408809](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2408809.zip), QC), RAN4 need to decide the necessity for the work to add explicit indications of HPUE support independent of decision above proposals

* Proposals
  + Option 1: Based on discussion paper ([R4-2408809](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2408809.zip)), RAN4 can support proposal 3.
    - Proposal 3: RAN4 shall keep continuing the work to add explicit indications of HPUE support independent of these proposals being agreed.
  + Option 2: TBA
* Recommended WF
  + The discussion paper was covered in [111][112]HPUE\_Basket\_inter-CA\_SUL not to duplicate topic in both thread. Not need further discussion.

### Sub-topic 1-8

*Sub-topic description*: **Other NR CA/DC CRs for corrections**

*Open issues and candidate options before meeting:*

**Issue 1-8-1:** Formal CR ([R4-2408729](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2408729.zip), Nokia) into TS38.101-1 Correction of cell issues in CA/DC band combination tables

* Proposals
  + Option 1: Based on CR ([R4-2408729](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2408729.zip)), RAN4 update the editorial corrections in TS38.101-1.
  + Option 2: TBA.
* Recommended WF
  + Option 1. Formal CR ([R4-2408729](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2408729.zip)) can be agreeable since there was no flagging.

**Issue 1-8-2:** Formal CR ([R4-2408730](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2408730.zip), Nokia) into TS38.101-3 Correction of some UL DC configurations without comma in band combinations.

* Proposals
  + Option 1: Based on CR ([R4-2408730](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2408730.zip)), RAN4 update for Some UL DC configurations without comma to consistence with other band combinations in TS38.101-3.
  + Option 2: TBA.
* Recommended WF
  + Option 1. Formal CR ([R4-2408730](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2408730.zip)) can be agreeable since there was no flagging.

**Issue 1-8-3:** Formal CR ([R4-2409240](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2409240.zip)) into TS38.101-3 for update with 10MHz CBW instead of 5MHz CBW in n77 NR band for MSD test configuration

* Proposals
  + Option 1: Based on CR ([R4-2409240](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2409240.zip)), RAN4 update the MSD test configuration with 10MHz CBW for n77 NR band in Table 7.3B.2.3.5.2-1.
  + Option 2: TBA.
* Recommended WF
  + Need to revise the formal CR ([R4-2409240](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2409240.zip)) based on Huawei suggestion. The revised version from VZW already shared in draft folder and it can be agreeable since Huawei was fine with the revision.

# Topic #2: Maintenance of Non-spectrum related WIs in Rel-18

*Main technical topic overview. The structure can be done based on sub-agenda basis.*

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| [R4-2407048](https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_111/Docs/R4-2407048.zip) (Formal CR: resubmission CR of the endorsed CR) | Apple, T-Mobile | Title: Clarification for the mandatory support of enhanced channel raster for the TN bands  **This is a resubmission (Cat. F) CR of the endorsed CR (R4-2404162) in TS38.101-1 to add the mandatory supporting NR Band n1, n2, n3, n5, n25, n26, n28, n66, n71 and n85.**  **Reason:** In last RAN4 meeting, RAN4 concluded to support the 10kHz new channel raster as mandatory feature in some NR bands.  **Proposal:** A new column is added to Table 5.4.2.3-5 and some bands can have enhanced channel raster as the mandatory feature. |
| [R4-2407228](https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_111/Docs/R4-2407228.zip) (Formal CR) | Apple | Title: Clarification for the enhanced channel raster and carrier aggregation  **This is a Formal CR (Cat. F) CR for TS38.101-1 in Rel-18**  **Reason:** This CR clarifies that the 10kHz raster can be used with carrier aggregation using the same nominal channel spacing.  **Proposal:** Added to 10kHz enahnced channel raster in clause 5.4.1.1 using the norminal channel spacing. 5.4.1 Channel spacing5.4.1.1 Channel spacing for adjacent NR carriers The spacing between carriers will depend on the deployment scenario, the size of the frequency block available and the channel bandwidths. The nominal channel spacing between two adjacent NR carriers is defined as following:  - For NR operating bands with 100 kHz or 10 kHz channel raster,  Nominal Channel spacing = (BWChannel(1) + BWChannel(2))/2 |
| [R4-2409397](https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_111/Docs/R4-2409397.zip) (Formal CR) | Huawei | Title: (NR\_channel\_raster\_enh-Core) Enhanced Channel raster for CA  **This is a Formal CR (Cat. F) CR for TS38.101-1 in Rel-18**  **Reason:** For NR operating bands with a 100 kHz channel raster, it is clarified that the nominal channel spacing for CA is kept unchanged for the enhanced channel raster.  **Proposal:** Add a phrases to inform the norminal channel spacing is not changed for CA when UE support enahnced channel raster in clause 5.4A.1. 5.4A.1 Channel spacing for CA For intra-band contiguous carrier aggregation with two or more component carriers, the nominal channel spacing between two adjacent NR component carriers is defined as the following unless stated otherwise:  For NR operating bands with a 100 kHz channel raster (including enhanced channel raster):    while for NR operating bands without a 100 kHz channel raster:    with  *n = µ0*  where BWChannel(1) and BWChannel(2) are the channel bandwidths of the two respective NR component carriers according to Table 5.3.2-1 with values in MHz, *μ0* is the largest *μ* value among the subcarrier spacing configurations supported in the operating band for both of the channel bandwidths according to Table 5.3.5-1 and *GBChannel(i)* is the minimum guard band for channel bandwidth i according to Table 5.3.3-1 for the said *μ* value with *μ* as defined in TS 38.211. In case there is no common μ value for both of the channel bandwidths, *μ0*=1 is selected and *GBChannel(i)* is the minimum guard band for channel bandwidth i according to Table 5.3.3-1 for *μ*=1 with *μ* as defined in TS 38.211.  The channel spacing for intra-band contiguous carrier aggregation can be adjusted to any multiple of least common multiple of channel raster (including enhanced channel raster) and sub-carrier spacing less than the nominal channel spacing to optimize performance in a particular deployment scenario. |
| [R4-2409398](https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_111/Docs/R4-2409398.zip) (Formal CR) | Huawei | Title: (NR\_channel\_raster\_enh-Core) Enhanced Channel raster for CA  **This is a Formal CR (Cat. F) CR for TS38.104 in Rel-18**  **Reason:** For NR operating bands with a 100 kHz channel raster, it is clarified that the nominal channel spacing for CA is kept unchanged for the enhanced channel raster.  **Proposal:** Add a phrases to inform the norminal channel spacing is not changed for CA when UE support enahnced channel raster in clause 5.4.1.2 5.4.1.2 Channel spacing for CA For intra-band contiguously aggregated carriers, the channel spacing between adjacent component carriers shall be multiple of least common multiple of channel raster and sub-carrier spacing.  The nominal channel spacing between two adjacent aggregated NR carriers is defined as follows:  For NR *operating bands* with 100 kHz channel raster (including enhanced channel raster):  For NR *operating bands* with 15 kHz channel raster:  with  For NR *operating bands* with 60kHz channel raster:  with  For operating band n263  Nominal Channel spacing = ceil((BWChannel(1) + BWChannel(2))/100.8)\*50.4 MHz,  where BWChannel(1) and BWChannel(2) are the *BS channel bandwidths* of the two respective NR component carriers according to Table 5.3.2-1, 5.3.2-2 and 5.3.2-3 with values in MHz, the largest value among the subcarrier spacing configurations supported in the operating band for both of the channel bandwidths according to Table 5.3.5-1 and Table 5.3.5-2 and *GBChannel(i)* the minimum guard band for channel bandwidth *i* according to Table 5.3.3-1, Table 5.3.3-2 and Table 5.3.3-2a for the said value, with as defined in TS 38.211 [9]. In case there is no common μ value for both of the channel bandwidths, μ0=1 is selected for NR *operating bands* with 15 kHz channel raster and *GBChannel(i)* is the minimum guard band for channel bandwidth i according to Table 5.3.3-1 for *μ*=1 with *μ* as defined in TS 38.211[9].  The channel spacing for *intra-band contiguous carrier aggregation* can be adjusted to any multiple of least common multiple of channel raster (including enhanced channel raster) and sub-carrier spacing less than the nominal channel spacing to optimize performance in a particular deployment scenario. |
| [R4-2409399](https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_111/Docs/R4-2409399.zip) (Formal CR) | Huawei | Title: (NR\_channel\_raster\_enh-Core) Enhanced Channel raster for intra-band EN-DC  **This is a Formal CR (Cat. F) CR for TS38.101-3 in Rel-18**  **Reason:** For NR operating bands with a 100 kHz channel raster, it is clarified that the nominal channel spacing for EN-DC is kept unchanged for the enhanced channel raster.  **Proposal:** Add a phrases to inform the norminal channel spacing is not changed for EN-DC when UE support enahnced channel raster in clause 5.4B.1. 5.4B.1 Channel spacing for intra-band EN-DC carriers The spacing between carriers will depend on the deployment scenario, the size of the frequency block available and the channel bandwidths. The nominal channel spacing between E-UTRA carrier and an adjacent NR carrier for intra-band contiguous EN-DC is defined as following:  - For NR operating bands with 100 kHz channel raster (including enhanced channel raster),  Nominal Channel spacing = (BWE-UTRA\_Channel + BWNR\_Channel)/2  - For NR operating bands with 15 kHz channel raster,  - Nominal Channel spacing = (BWE-UTRA\_Channel + BWNR\_Channel)/2+{-5kHz, 0kHz, 5kHz} for ∆FRaster equals to 15 kHz  - Nominal Channel spacing = (BWE-UTRA\_Channel + BWNR\_Channel)/2+{-10 kHz, 0 kHz, 10 kHz} for ∆FRaster equals to 30 kHz  where BWE-UTRA\_Channel and BWNR\_Channel are the channel bandwidths of the E-UTRA and NR carriers, ∆FRaster is theband dependent channel raster granularity defined in TS38.101-1[2]. The channel spacing can be adjusted depending on the channel raster to optimize performance in a particular deployment scenario. |
| [R4-2407719](https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_111/Docs/R4-2407719.zip) (Formal CR) | Ericsson | Title: (NR\_channel\_raster\_enh-Core) Amendment of the definition of the enhanced channel raster  **This is a Formal CR (Cat. F) CR for TS38.101-1 in Rel-18**  **Reason:** The concrete problem is handling of UE implementations only capable of locating their channel bandwidth (when configured by RRC) on the 100 kHz channel raster. That the enhanced channel raster and the associated capability lift this restriction is not clear from 38.101-1: a UE indicating the capability *enhancedChannelRaster-r18* in *BandNR* shall   1. be capable of locating its UE-specific channel bandwith in accordance with ServingCellConfig with PRB granularity within a carrier bandwidth. 2. Meet the minimum requirements (scope of 38.101-1) for all possible locations each of which is on the Enhanced channel raster but not necessarily on the 100 kHz raster.   **Proposal:** Clause 5.4.2.3: specify that indication of *enhancedChannelRaster-r18* for a band implies that a UE is compliant with minimum requirements for all possible UE specific channel bandwidth and locations configurable by *ServingCellConfig* for the DL and UL in the band.  Table 5.4.2.3-4: Allowed NREF (NR-ARFCN) for operation in Band n102   |  |  | | --- | --- | | Channel Bandwidth | Allowed NREF | | 20 MHz | 7956681, 797000, 798332, 799668, 801000, 802332, 803668, 805000, 806332, 807668, 809000, 810332, 811668, 813000, 814332,  815668, 817000, 818332, 819668, 821000, 822332, 823668, 825000, 826332, 827668 | | 40 MHz | 797668, 800332, 803000, 805668, 808332, 811000, 813668, 816332, 819000, 821668, 824332, 827000 | | 60 MHz | 798332, 799668, 803668, 805000, 809000, 810332, 814332, 815668, 819668, 821000, 825000, 826332 | | 80 MHz | 799000, 804332, 809668, 815000, 820332, 825668 | | 100 MHz | 799668, 803668, 810332, 814332, 821000, 825000 | | Note 1: NREF is only applicable for DL only operation | |   For NR operating bands with 100 kHz channel raster, Enhanced channel raster is defined with ΔFRaster = 2 × ΔFGlobal. In this case every 2th NR-ARFCN within the operating band are applicable for the channel raster within the operating band and the step size for the channel raster in Table 5.4.2.3‑5 is given as <2>.  A UE indicating *enhancedChannelRaster-r18* for a band supports the Enhanced channel raster and is compliant with minimum requirements for all possible UE specific channel bandwidth and locations configurable by *ServingCellConfig* [7] for the DL and UL in the band. |
| [R4-2407049](https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_111/Docs/R4-2407049.zip) (Formal CR: resubmission CR of the endorsed CR) | Apple, Ligado Networks, Inmarsat, Viasat, Globalstar, Thales, Hughes/Echostar, Omnispace, Terrestar | Title: Clarification for the mandatory support of enhanced channel raster for the NTN bands  **This is resubmission (Cat. F) CR of the endorsed CR (R4-2404163) in TS38.101-5 to add the mandatory supporting NR NTN Band n254, n255 & n256 in Rel-18.**  Table 5.4.2.3-2: Applicable NR-ARFCN per operating band   |  |  |  |  |  | | --- | --- | --- | --- | --- | | NTN satellite operating band | ΔFRaster  (kHz) | Uplink  Range of NREF  (First – <Step size> – Last) | Downlink  Range of NREF  (First – <Step size> – Last) | Mandatory support | | n256 | 10 | 396000 – <2> – 402000 | 434000 – <2> – 440000 | Yes | | n255 | 10 | 325300 – <2> – 332100 | 305000 – <2> – 311800 | Yes | | n254 | 10 | 322000 – <2> – 325300 | 496700 – <2> – 500000 | Yes | | NOTE: The channel numbers that designate carrier frequencies so close to the operating band edges that the carrier extends beyond the operating band edge shall not be used. These channel numbers shall also be such that the minimum guard band for each channel bandwidth and SCS specified in Table 5.3.3-1 are met for carriers located at the upper or lower edge of an operating band. | | | | | | |
| [R4-2407720](https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_111/Docs/R4-2407720.zip) (Formal CR) | Ericsson | Title: (NR\_channel\_raster\_enh-Core) Amendment of the definition of the enhanced channel raster  **This is a Formal CR (Cat. F) CR for TS38.101-5 in Rel-18**  **Reason:** The concrete problem is handling of UE implementations only capable of locating their channel bandwidth (when configured by RRC) on the 100 kHz channel raster. That the enhanced channel raster and the associated capability lift this restriction is not clear from 38.101-5: a UE indicating the capability *enhancedChannelRaster-r18* in *BandNR* shall   1. be capable of locating its UE-specific channel bandwith in accordance with ServingCellConfig with PRB granularity within a carrier bandwidth. 2. Meet the minimum requirements (scope of 38.101-5) for all possible locations each of which is on the Enhanced channel raster but not necessarily on the 100 kHz raster.   **Proposal:** Clause 5.4.2.3: specify that indication of *enhancedChannelRaster-r18* for a band implies that a UE is compliant with minimum requirements for all possible NTN UE specific channel bandwidth and locations configurable by *ServingCellConfig* for the DL and UL in the band. 5.4.2.3 Channel raster entries for each operating band The RF channel positions on the channel raster in each NTN satellite operating band are given through the applicable NR-ARFCN in Table 5.4.2.3‑1 and Table 5.4.2.3-2, using the channel raster to resource element mapping in clause 5.4.2.2.  For NTN satellite operating bands with 100 kHz channel raster, ΔFRaster = 20 × ΔFGlobal. In this case every 20th NR-ARFCN within the operating band are applicable for the channel raster within the operating band and the step size for the channel raster in Table 5.4.2.3‑1 is given as <20> for FR1-NTN and Table 5.4.2.3-3 for FR2-NTN.  Table 5.4.2.3-1: Applicable NR-ARFCN per operating band in FR1-NTN   |  |  |  |  | | --- | --- | --- | --- | | NTN satellite operating band | ΔFRaster  (kHz) | Uplink  Range of NREF  (First – <Step size> – Last) | Downlink  Range of NREF  (First – <Step size> – Last) | | n256 | 100 | 396000 – <20> – 402000 | 434000 – <20> – 440000 | | n255 | 100 | 325300 – <20> – 332100 | 305000 – <20> – 311800 | | n254 | 100 | 322000 – <20> – 325300 | 496700 – <20> – 500000 | | NOTE : The channel numbers that designate carrier frequencies so close to the operating band edges that the carrier extends beyond the operating band edge shall not be used. | | | |   For NTN operating bands with 100 kHz channel raster, Enhanced channel raster is defined with ΔFRaster = 2 × ΔFGlobal. In this case every 2th NR-ARFCN within the operating band are applicable for the channel raster within the operating band and the step size for the channel raster in Table 5.4.2.3‑2 is given as <2>.  A UE indicating *enhancedChannelRaster-r18* for a band supports the Enhanced channel raster and is compliant with minimum requirements for all possible UE specific channel bandwidth and locations configurable by *ServingCellConfig* [8] for the DL and UL in the band. |
| [R4-2407229](https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_111/Docs/R4-2407229.zip) (Discussion) | Apple | Title: On UE capabilities for the enhanced channel raster  **This is a discussion paper for the UE capability signalling of enhanced channel raster**  Proposal 1: If enhanced channel raster can be mandatory for the earlier releases, we ask RAN WG4 to decide how it will be captured in earlier releases.  Proposal 2: Rel-17 RedCap devices can follow the same RAN WG4 process on defining for which bands the enhanced channel raster is mandatory (and potentially starting from which release). |
| [R4-2407322](https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_111/Docs/R4-2407322.zip) (Discussion) | Ericsson | Title: Mandated support of the enhanced channel raster by RedCap UEs from Rel-17  **This is a discussion paper for the RedCap UE capability signalling of enhanced channel raster**  **Observation 1: mandated support of the enhanced channel raster for all RedCap UE from Rel-17 is the only feasible solution if performance degradation and less efficient spectrum utilization for all UEs in a cell wider than 20 MHz supporting RedCap UEs are to be avoided.**  **Observation 2: upgrade of non-RedCap UEs supporting a maximum CHBW of 20 MHz and restricted to the 100 kHz channel raster, if any in the field, appears more viable than specific network configurations for support of RedCap UEs that imply degraded performance and less efficient spectrum utilization for all UEs required just because of a small volume of non-supporting legacy UEs.**  **Proposal 1: support of the enhanced channel raster is mandated for all RedCap UEs from Rel-17, eRedCap UEs from Rel-18. For RedCap UEs, specify the enhanced channel raster for applicable bands in the Rel-17 and Rel-18 versions of 38.101-1 as an essential correction.**  **Proposal 2: make RAN2 aware of these essential corrections by an LS as per the draft attached below.** |
| [R4-2408628](https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_111/Docs/R4-2408628.zip) (Discussion) | Nokia | Title: Enhanced channel raster UE capability  **This is a discussion paper for enhanced channel raster how to apply in specification and whether to apply for RedCap device of the enhanced channel raster.**  ***Observation 1: It was not discussed in Rel-17 RedCap WI whether the UE specific channel bandwidth is signaled from the network to explicitly indicate the position of the filter bandwidth when the system bandwidth (SIB1) is wider than 20 MHz***  ***Proposal 1: It is proposed to agree at least one configuration that can support the legacy 20 MHz RedCap UE in 25 MHz SIB1 bandwidth.***  ***Proposal 2: It is proposed to remove the line with ‘FFS’ from the Feature list #28 NR\_channel\_raster\_enh.*** |
| [R4-2409400](https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_111/Docs/R4-2409400.zip) (Discussion) | Huawei | Title: UE capability for Redcap UE  **This is a discussion paper for enhanced channel raster to support new 10kHz raster for RedCap UEs as follow**  it is not possible to assume this new feature can be mandate for the Rel-17 commercial Redcap UEs. Hence it is unfortunately that it has to be an optional feature for Rel-17. Hence we propose that the channel raster enhancement feature is optional for Rel-17 RedCap UE.  **Proposal**: it is proposed to remove FFS for RedCap UE in the RAN4 feature list, i.e. the same UE capability framework as MBB UEs is applicable for Redcap UEs. |
| [R4-2407996](https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_111/Docs/R4-2407996.zip) (Formal CR) | China Telecomunication | Title: Update on definition of GEO  **This is a Formal CR (Cat. F) CR for TS36.102 in Rel-18**  **Reason:** There are abbreviations on both GEO and GSO. However, there is no explicit definition on GEO which may cause confusion  **Proposal:** Add term of “Geostation Orbit (GEO)” and update definition of GSO (Geosynchronous Orbit) in the section 3.1 Terms and 3.3 Abbreviations in TS36.102. 3.1 Terms **Geostationary Orbit:** A non-inclined geosynchronous orbit whose circular and direct orbit lies in the plane of the Earth's equator.  **Geosynchronous Orbit:** Earth-centred orbit at approximately 35786 kilometres above Earth's surface and synchronised with Earth's rotation.  **Low Earth Orbit:** Orbit around the Earth with an altitude between 300 km, and 1500 km.  **Satellite:** A space-borne vehicle embarking a bent pipe payload or a regenerative payload telecommunication transmitter, placed into Low-Earth Orbit (LEO), Medium-Earth Orbit (MEO), or Geostationary Orbit (GEO). 3.3 Abbreviations GEO Geostationary Orbit |
| [R4-2409669](https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_111/Docs/R4-2409669.zip) (Formal CR: Resubmission of the endorsed Draft CR) | Nokia | Title: CR to 38.101-1 on Aerial Specific Pmax Values  **This is a resubmission CR of the endorsed CR (R4-2406675) for TS38.101-1 in Rel-18**  **Reason:** This CR contents are proposed based on the discussion paper [R4-2405746](https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_110bis/Docs/R4-2405746.zip) and approved reply LS in R4-2403830  **Proposal:**   1. New subclause added (6.2K.4) to include the determination of UE confiured power for aerial UEs 2. Remove duplicated text from clause 6.2K.3.1 3. Remove square brackets from Table 6.2K.3.1-1 |
| [R4-2409671](https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_111/Docs/R4-2409671.zip) (Formal CR: Resubmission of the endorsed Draft CR) | Nokia | Title: CR to 36.101 on Aerial Specific Pmax Values  **This is a resubmission CR of the endorsed CR (R4-2405748) for TS36.101 in Rel-18**  **Reason:** This CR contents are proposed based on the discussion paper [R4-2405746](https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_110bis/Docs/R4-2405746.zip) and approved reply LS in R4-2403830  **Proposal:** New subclause added (6.2.5K) to include the determination of UE confiured power for aerial UEs. |

## Open issues summary

*Before Meeting, moderators shall summarize list of open issues, candidate options and possible WF (if applicable) based on companies’ contributions.*

### Sub-topic 2-1

*Sub-topic description:* **NR Channel raster enhancement in TN**

*Open issues and candidate options before meeting:*

**Issue 2-1-1:** Enhanced channel raster table format to distinguish mandatory or optional feature in TS38.101-1

* Proposals
  + Option 1: RAN4 can agreed the resubmission Formal CR ([R4-2407048](https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_111/Docs/R4-2407048.zip), Apple, TM-US) of endorsed CR (R4-2404162) in TS38.101-1.
  + Option 2: TBA
* Recommended WF
  + Option 1. The resubmission Formal CR ([R4-2407048](https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_111/Docs/R4-2407048.zip), Apple) including n26 can be agreeable.

**Issue 2-1-2:** CR for enhanced channel raster for CA operation in TS38.101-1

* Proposals
  + Option 1: Based on CR ([R4-2407228](https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_111/Docs/R4-2407228.zip), Apple), add to the 10kHz enahnced channel raster in clause 5.4.1.1 using the norminal channel spacing for normal NR UE.

**5.4.1.1 Channel spacing for adjacent NR carriers**

* + - For NR operating bands with 100 kHz or 10 kHz channel raster,

Nominal Channel spacing = (BWChannel(1) + BWChannel(2))/2

* + Option 2: Based on CR ([R4-2409397](https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_111/Docs/R4-2409397.zip), Huawei), add to the 10kHz enahnced channel raster in clause 5.4A.1 using the norminal channel spacing for NR CA UE.

**5.4A.1 Channel spacing for CA**

* + - For intra-band contiguous carrier aggregation with two or more component carriers, the nominal channel spacing between two adjacent NR component carriers is defined as the following unless stated otherwise:

For NR operating bands with a 100 kHz channel raster (including enhanced channel raster):

* Recommended WF
  + Flagging by Ericsson on CR ([R4-2407228](https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_111/Docs/R4-2407228.zip), Apple). The change is not needed.
  + Flagging by QC, Ericsson on CR ([R4-2409397](https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_111/Docs/R4-2409397.zip), Huawei). QC commented that Enhanced channel raster is not needed with CA so such clarification is not needed. Also, Ericsson commented that the proposed changes imply that the CHBW must be on the 100 kHz raster regardless of capability.
  + For the flagging from QC, Ericsson, Huawei replied that RAN4 can either clarify the applied nominal CA channel spacing for enhance channel raster or clarify no support of CA for it. We should make a decision and move forward.
  + Need further discussion in online session.

**Issue 2-1-3:** CR for enhanced channel raster for CA operation in TS38.104

* Proposals
  + Option 1: Based on CR ([R4-2409398](https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_111/Docs/R4-2409398.zip), Huawei), add a phrases to inform the norminal channel spacing is not changed for CA when UE support enahnced channel raster in clause 5.4.1.2

**5.4.1.2 Channel spacing for CA**

* + - For intra-band contiguously aggregated carriers, the channel spacing between adjacent component carriers shall be multiple of least common multiple of channel raster and sub-carrier spacing.

The nominal channel spacing between two adjacent aggregated NR carriers is defined as follows:

For NR *operating bands* with 100 kHz channel raster (including enhanced channel raster):

* + Option 2: Other option is not precluded.
* Recommended WF
  + Flagging by QC, Ericsson on CR ([R4-2409398](https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_111/Docs/R4-2409397.zip), Huawei). QC commented that Enhanced channel raster is not needed with CA so such clarification is not needed. Also, Ericsson commented that the proposed changes imply that the CHBW must be on the 100 kHz raster regardless of capability.
  + For the flagging from QC, Ericsson, Huawei replied that RAN4 can either clarify the applied nominal CA channel spacing for enhance channel raster or clarify no support of CA for it. We should make a decision and move forward.
  + Need further discussion in online session.

**Issue 2-1-4:** CR for enhanced channel raster for intra-band EN-DC operation in TS38.101-3

* Proposals
  + Option 1: Based on CR ([R4-2409399](https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_111/Docs/R4-2409399.zip), Huawei), add a phrases to inform the norminal channel spacing is not changed for EN-DC when UE support enahnced channel raster in clause 5.4B.1.

**5.4B.1 Channel spacing for intra-band EN-DC carriers**

* + - The spacing between carriers will depend on the deployment scenario, the size of the frequency block available and the channel bandwidths. The nominal channel spacing between E-UTRA carrier and an adjacent NR carrier for intra-band contiguous EN-DC is defined as following:

For NR operating bands with 100 kHz channel raster (including enhanced channel raster),

* + Option 2: Other option is not precluded.
* Recommended WF
  + Flagging by QC, Ericsson on CR ([R4-2409399](https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_111/Docs/R4-2409397.zip), Huawei). QC commented that Enhanced channel raster is not needed with CA so such clarification is not needed. Also, Ericsson commented that the proposed changes imply that the CHBW must be on the 100 kHz raster regardless of capability.
  + For the flagging from QC, Ericsson, Huawei replied that RAN4 can either clarify the applied nominal CA channel spacing for enhance channel raster or clarify no support of CA for it. We should make a decision and move forward.
  + Need further discussion in online session.

**Issue 2-1-5:** CR on specify the minimum RF requirements for enhanced channel raster capable UE in TS38.101-1.

* Proposals
  + Option 1: Based on CR ([R4-2407719](https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_111/Docs/R4-2407719.zip), Ericsson), RAN4 add the following sentences in Clause 5.4.2.3
    - “A UE indicating *enhancedChannelRaster-r18* for a band supports the Enhanced channel raster and is compliant with minimum requirements for all possible UE specific channel bandwidth and locations configurable by *ServingCellConfig* [7] for the DL and UL in the band.”
  + Option 2: Other option is not precluded.
* Recommended WF
  + Flagging by Apple, QC, Nokia & Huawei on CR ([R4-2407719](https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_111/Docs/R4-2407719.zip), Ericsson). Apple commented that to understand better the intention behind this clarification and why it is needed. There was no difference between 100kHz channel raster and 10kHz channel raster. But it would be interpreted to define the additional specific requirements for 10kHz channel raster.
  + QC commented that This CR is not needed and is not technically correct. Signaling allows for a granularity of 5kHz but the raster granularity is not 5kHz. Also, Nokia commented that wonder if an explicit statement about the UE's need of compliance only for the enhanced channel raster makes sense. Furthermore, ‘configurable by *ServingCellConfig*’ may be ambiguous because the number format in *ServingCellConfig* may allow for the NR-ARFCN granularity rather than the enhanced channel raster.
  + Also, Huawei commented that hange is not needed, which should be the same as normal channel raster.
  + Need further discussion in online session.

### Sub-topic 2-2

*Sub-topic description:* **NR Channel raster enhancement for NTN**

*Open issues and candidate options before meeting:*

**Issue 2-2-1:** Correction on TS38.101-5 for Mandatory or option supporting of enhanced channel raster for NTN bands in TS38.101-5.

* Proposals
  + Option 1: RAN4 can agreed the resubmission Formal CR ([R4-2407049](https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_111/Docs/R4-2407049.zip), Apple) of endorsed CR (R4-2404163) in TS38.101-5.
  + Option 2: TBA
* Recommended WF
  + Option 1. The resubmission ([R4-2407049](https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_111/Docs/R4-2407049.zip), Apple) can be agreeable.

**Issue 2-2-2:** CR on specify the minimum RF requirements for enhanced channel raster capable NTN UE in TS38.101-5.

* Proposals
  + Option 1: Based on CR ([R4-2407720](https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_111/Docs/R4-2407720.zip), Ericsson), RAN4 add the following sentences in Clause 5.4.2.3
    - A UE indicating *enhancedChannelRaster-r18* for a band supports the Enhanced channel raster and is compliant with minimum requirements for all possible UE specific channel bandwidth and locations configurable by *ServingCellConfig* [8] for the DL and UL in the band.
  + Option 2: Other option is not precluded.
* Recommended WF
  + Flagging by Apple, QC, Nokia & Huawei on CR ([R4-2407720](https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_111/Docs/R4-2407719.zip), Ericsson) for NTN UE as same in [R4-2407719](https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_111/Docs/R4-2407719.zip).
  + Need further discussion in online session.

### Sub-topic 2-3

*Sub-topic description:* **NR channel raster capability for RedCap**

*Open issues and candidate options before meeting:*

**Previous RAN4 agreements for capability signalling of enhance channel raster**

1. **For TN and NTN (based on the agreed UE feature list and WF)**

**- Mandatory with capability signaling for all Rel-18 UEs for certain bands as defined in 38.101-1 and 38.101-5.**

**- Should be early implementable from Rel-16.**

1. **For Redcap**

**- For Rel-18, at least support enhanced channel raster as mandatory feature for Redcap UEs in the same set of NR operating bands for eMBB UEs. FFS on other NR bands.**

**- For Rel-17, FFS**

**Issue 2-3-1:** How to apply the enhanced channel raster for the RedCap UE and RedCap operating bands?

* Proposals
  + Option 1: Based on discussion paper ([R4-2407229](https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_111/Docs/R4-2407229.zip), Apple), Rel-17 RedCap devices can follow the same RAN WG4 process on defining for which bands the enhanced channel raster is mandatory (and potentially starting from which release) or optional.
  + Option 2: Based on discussion paper ([R4-2409400](https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_111/Docs/R4-2409400.zip) (Huawei) & [R4-2408628](https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_111/Docs/R4-2408628.zip) (Nokia)), RAN4 only support the enhanced channel raster as optional feature for Redcap UEs from Rel-17 with capability signalling.
  + Option 3: Based on discussion paper ([R4-2407322](https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_111/Docs/R4-2407322.zip), Ericsson), RAN4 can support of the enhanced channel raster is mandated for all RedCap UEs from Rel-17, eRedCap UEs from Rel-18.
* Recommended WF
  + Need further discussion in online session.

**Issue 2-3-2:** Which configuration option should be supported for RedCap UE to support enhanced channel raster for wider CBW (i.e. 25MHz) in gNB?

* Proposals
  + Option 1: Based on discussion paper ([R4-2408628](https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_110bis/Docs/R4-2405660.zip), Nokia), at least one configuration that can support the legacy 20 MHz RedCap UE in 25 MHz SIB1 bandwidth.
    - 1) The SIB1 carrierBandwidth is placed on the 100 kHz channel raster, no UE specific CHBW is signaled, but a BWP of 106 RBs is configured off the 100 kHz channel raster.
    - 2) The SIB1 carrierBandwidth is placed 10 kHz above the 100 kHz channel raster, no UE specific CHBW is signaled, and a BWP of 106 RBs is configured on the 100 kHz channel raster. (Due to NR's asymmetric subcarrier distribution, an upshift of the carrier frequency by up to one subcarrier spacing is compatible with the minimum guard band requirement.)
    - 3) The SIB1 carrierBandwidth is placed 10 kHz above the 100 kHz channel raster, and a UE specific CHBW and a BWP of 106 RBs, respectively, are configured on the 100 kHz channel raster.
  + Option 2: Based on discussion paper ([R4-2407322](https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_111/Docs/R4-2407322.zip), Ericsson), all cases are raised system performance degradations. Hence RAN4 shall support of the enhanced channel raster is mandated for all RedCap UEs which would be inform to RAN2 for these essential corrections by an LS.
  + Option3: Other option is not precluded.
* Recommended WF
  + Need further discussion in online session.

**Issue 2-3-3:** Update UE feature lists of the enhance channel raster for RedCap UEs

* Proposals
  + Option 1: Based on discussion paper ([R4-2409400](https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_111/Docs/R4-2409400.zip) (Huawei) & [R4-2408628](https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_111/Docs/R4-2408628.zip) (Nokia)), RAN4 remove “FFS for RedCap”.
  + Option 2: Above issue 2-3-1 and issue 2-3-2 decision, the final UE feature lists will be updated.
  + Option3: Other option is not precluded.
* Recommended WF
  + Need further discussion in online session.

### Sub-topic 2-4

*Sub-topic description:* **LTE NB-IoT UE RF requirements**

*Open issues and candidate options before meeting:*

**Issue 2-4-1:** update the definition of GEO and GSO in TS36.102

* Proposals
  + Option 1: Based on CR ([R4-2407996](https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_111/Docs/R4-2407996.zip), China Telecomm), RAN4 update the definition of Geostation Orbit (GEO) and Geosynchronous Orbit(GSO) in the section 3.1 Terms and 3.3 Abbreviations in TS36.102.
  + Option 2: TBA
* Recommended WF
  + Need to revise to align with ITU definitions for GEO and GSO based on Huawei flagging as follow
  + Geostationary satellite: A geosynchronous satellite whose circular and direct orbit lies in the plane of the Earth’s equator and which thus remains fixed relative to the Earth; by extension, a geosynchronous satellite which remains approximately fixed relative to the Earth.
  + Geostationary-Satellite Orbit: The orbit of a geosynchronous satellite whose circular and direct orbit lies in the plane of the Earth's equator.
  + Geosynchronous Earth Orbit: Earth-centered orbit at approximately 35786 kilometres above Earth's surface and synchronised with Earth's rotation. A geostationary orbit is a non-inclined geosynchronous orbit, i.e. in the Earth’s equator plane.
  + Geosynchronous satellite: An earth satellite whose period of revolution is equal to the period of rotation of the Earth about its axis.

### Sub-topic 2-5

*Sub-topic description:* **NR Support for UAV**

*Open issues and candidate options before meeting:*

**Issue 2-5-1:** Additional definition of Aerial UE Pmax in configured Transmitted power clause in TS38.101-1

* Proposals
  + Option 1: RAN4 can agreed the resubmission Formal CR ([R4-2409669](https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_111/Docs/R4-2409669.zip), Nokia) of endorsed CR (**R4-2406675**) in TS38.101-1.
  + Option 2: TBA
* Recommended WF
  + Clarification is needed how to distinguish Normal UE and UAV UE with the identical IE “*additionalSpectrumEmission*”
  + After solving of the clarification point, the resubmission formal CR ([R4-2409669](https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_111/Docs/R4-2409669.zip)) can be decided the status.

### Sub-topic 2-6

*Sub-topic description:* **Enhanced LTE Support for UAV**

*Open issues and candidate options before meeting:*

**Issue 2-6-1:** Additional definition of Aerial UE Pmax in configured Transmitted power clause in TS36.101

* Proposals
  + Option 1: RAN4 can agreed the resubmission Formal CR ([R4-2409671](https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_111/Docs/R4-2409671.zip), Nokia) of endorsed CR (**R4-2405748**) in TS36.101.
  + Option 2: TBA
* Recommended WF
  + Option 1. The resubmission CR([R4-2409671](https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_111/Docs/R4-2409671.zip)) can be agreeable.

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