**3GPP TSG-RAN4 Meeting #100-e *R4-2115134***

**Online, , 16th - 27th August 2021**

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| *CR-Form-v12.1* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
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|  | **38.817-01** | **CR** | **0022** | **rev** |  | **Current version:** | **15.6.0** |  |
|  | | | | | | | | |
| *For* [***HE******LP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* | | | | | | | | |
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| ***Proposed change affects:*** | UICC apps |  | ME | **x** | Radio Access Network |  | Core Network |  |

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| ***Title:*** | CR for EESS protection for FR2 NR bands in TR 38.817-01 (Rel-15) | | | | | | | | | |
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| ***Source to WG:*** | MCC | | | | | | | | | |
| ***Source to TSG:*** | R4 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | NR\_newRAT-Core | | | | |  | ***Date:*** | | | 2021-08-31 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **F** |  | | | | | ***Release:*** | | | Rel-15 |
|  | *Use one of the following categories:* ***F*** *(correction)* ***A*** *(mirror corresponding to a change in an earlier release)* ***B*** *(addition of feature),* ***C*** *(functional modification of feature)* ***D*** *(editorial modification)*  Detailed explanations of the above categories can be found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | | | | | | | | *Use one of the following releases: Rel-8 (Release 8) Rel-9 (Release 9) Rel-10 (Release 10) Rel-11 (Release 11) … Rel-15 (Release 15) Rel-16 (Release 16) Rel-17 (Release 17) Rel-18 (Release 18)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | To capture the outcome of the RAN4 discussion on the impact of the WRC-19 decision on FR2 band requirements to provide a convenient reference for the future.  R4-2011689(CR to TR 38.817-01) was agreed to capture a common understanding of all applicable regulatory requirements, the necessary A-MPR to comply with these requirements, and the NS signaling structure.  After that, RAN4 further discussed the issue related to the introduction of new NS(s) into already existing band(s). This CR captures the related agreements described in R4-2009141. The solution has already been specified for NS\_203 in TS 38.101-2. However, NS(s) associated with the requirements applied to UE brought into use after 2024 and 2027 have not yet introduced in TS 38.101-2. This CR provide the recerence for the future when these NSs will be introduced. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | 1: Capture the background of the issue related to the introduction of new NS(s) into already existing band(s).  2: Capture the agreed solution of explicit signaling for a UE to report newly supported NS value(s) for a legacy band to the network (reuse modifiedMPR bits), and the agreement that newly introduced NS is mandatory for UE brought into use at least after the changeover date.  3: Clarify the status of NSs associated with the requirements applied to UE brought into use after 2024 and 2027 which have not yet introduced in TS 38.101-2. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | The status of NSs associated with the requirements applied to UE brought into use after 2024 and 2027 is unclear. If these NSs are introduced in incorrect way in the future, it may cause connectivity issues and violation of regulatory, as described in R4-2000220 and R4-2003241. | | | | | | | | |
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| ***Clauses affected:*** | | 7.5.4.1 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  | **X** | Other core specifications | | | | TS/TR ... CR ... | | |
| ***affected:*** | |  | **X** | Test specifications | | | | TS/TR ... CR ... | | |
| ***(show related CRs)*** | |  | **X** | O&M Specifications | | | | TS/TR ... CR ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

<Unchaged sections are omitted>

### 7.5.4 Spurious emission

#### 7.5.4.1 Protection of earth exploration-satellite service

The International Telecommunication Union World Radiocommunication Conference 2019 (WRC-19) created an internationally recognized 24.25 to 27.5 GHz band aiming at primary mobile allocation for licensed/IMT networks deployments. In addition to it, the limits of unwanted emission power from active service stations in that band were specified to protect 23.6-24 GHz EESS (passive) band.

A summary of the WRC-19 agreement related to EESS unwanted emission limits is given below [13]:

For 5G Base stations:

- -33 dBW in any 200 MHz of the EESS (passive) band for IMT/5G base stations brought into use before 1st September 2027.

- -39 dBW in any 200 MHz of the EESS (passive) band for IMT/5G base stations brought into use after 1st September 2027.

- The -39 dBW/200 MHz limit will not apply to 5G base stations which have been brought into use prior to this date.

- For those base stations, the limit of -33 dBW/200 MHz will continue to indefinitely apply after this date.

For 5G User equipment:

- -29 dBW in any 200 MHz of the EESS (passive) band for IMT/5G user equipment brought into use before 1st September 2027.

- -35 dBW in any 200 MHz of the EESS (passive) band for IMT/5G user equipment brought into use after 1st September 2027.

- The -35 dBW/200 MHz limit will not apply to UEs which have been brought into use prior to this date.

- For those UEs, the limit of -29 dBW/200 MHz will continue to indefinitely apply after this date.

NOTE 1: these out-of-band emission limits are equally applicable to all license holders within the band.

The relation between "active service band" and 3GPP bands is illustrated in Figure 7.5.4.1-1 below. NR band n258 frequency ranges from 24.25 to 27.5 GHz, which is identical to the aforementioned WRC active service band. Furthermore, 3GPP band n257 partially overlaps with "active service band", and thus ideally should be also considered while analysing potential specification impact.



Figure 7.5.4.1-1: EESS passive band, active service band, and 3GPP bands n257 and n258.

Combining the WRC-19 outcome with the existing spurious emissions requirements in TS38.101-2, Table 7.5.4.1-1 summarizes the common understanding of emissions requirements globally and regionally.

Table 7.5.4.1-1: Summary of emissions requirements applicable to FR2 devices

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Region | Requirement 1 | Requirement 2 | Requirement 3 | Requirement 4 | Requirement 5 | Requirement 6 |
| Global, US, Japan | Protected range: spurious  Band applicability: all  Limit:  -13 dBm/MHz | Protected range: 23.6 - 24.0 GHz  Band applicability: n258, n257  Limit:  +1 dBm/200 MHz | Protected range: 23.6 - 24.0 GHz  Band applicability: n258, n257  Limit:  -5 dBm/200 MHz | N/A | Protected range: 36.0 to 37.0 GHz  Band applicability: n259  Limit:  +7 dBm/1000 MHz | Protected range: 36.0 to 37.0 GHz  Band applicability: n260, n259  Limit:  -13 dBm/1 MHz |
| Europe | Protected range: 7.25 GHz ≤ f ≤ 2nd harmonic  Band applicability: all bands  Limit:  -10 dBm/100 MHz |

The A-MPR needed to comply with these requirements is summarized in Table 7.5.4.1-2.

Table 7.5.4.1-2: Summary of A-MPR needed to comply with the regulatory requirements in Table 7.5.4.1-1

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Band | Requirement | A-MPR for PC1 | A-MPR for PC2 | A-MPR for PC3 | A-MPR for PC4 |
| n258 | (Case A)  Protected range: 23.6 - 24.0 GHz  Limit:  +1 dBm/200 MHz | 3.0 if Offset frequency < BWchannel, 0.0 otherwise | 0 | 0 | 0 |
| n257 | 0 (absorb as general requirement) | 0 (absorb as general requirement) | 0 (absorb as general requirement) | 0 (absorb as general requirement) |
| n258 | (Case B)  Protected range: 23.6 - 24.0 GHz  Limit:  -5 dBm/200 MHz | 7.0 if Offset frequency < BWchannel, 6.0 otherwise | 1.0 if Offset frequency < BWchannel, 0.0 otherwise | 1.0 if Offset frequency < BWchannel, 0.0 otherwise | 1.0 if Offset frequency < BWchannel, 0.0 otherwise |
| n257 |
| n259 | (Case C)  Limit:  +7 dBm/1000 MHz  and -13 dBm/1 MHz | 0 (absorb as general requirement) | 0 (absorb as general requirement) | 0 (absorb as general requirement) | 0 (absorb as general requirement) |

Where Case A represents Requirements 1 and 2 from Table 7.5.4.1-1 applied to bands n258 and n257; Case B represents Requirements 1 and 3 applied to bands n258 and n257; Case C represents Requirements 1, 5, and 6 applied to band n259.Because of the delayed implementation of Requirement 3 from Table 7.5.4.1-1, RAN4 will incorporate the new NS value structure in a future release, such that the timing of UEs achieving certification according to that release and the timing of the WRC-19 regulation coming into effect is aligned.

To assist such future discussions, Table 7.5.4.1-3 below captures the recommended NS value structure.

Table 7.5.4.1-3: Summary of NS values aligned with the WRC-19 outcome

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | n257 | n258 | n259 | n260 | Status of each NSs |
| NS\_200 | 1dBm/200MHz into general | No change | 7dBm/1GHz into general | No change | Completed |
| NS\_2011 |  |  |  |  | Completed |
| NS\_2022 | -10dBm/100MHz (Harmonic) and  +1dBm/200MHz | -10dBm/100MHz (Harmonic) and  +1dBm/200MHz |  |  | Completed |
| NS\_2033 |  | 1dBm/200MHz |  |  | Completed |
| NS\_20X4 | -5 dBm/200 MHz | -5 dBm/200 MHz |  |  | To be introduced in TS 38.101-2 |
| NS\_20Y5 | -10dBm/100MHz (Harmonic) and  -5dBm/200MHz | -10dBm/100MHz (Harmonic) and  -5dBm/200MHz |  |  | To be introduced in TS 38.101-2 |
| NOTE 1: NS\_201 is Obsolate  NOTE 2: Applicable before 01 January 2024  NOTE 3: Applicable before 01 September 2027  NOTE 4: Applicable after 01 September 2027  NOTE 5: Applicable after 01 January 2024 | | | | | |

When we introduce new NS(s) into already existing band(s), there would be two types of UE existing in a real environment: one is UE working with an existing NS and the other is UE working with a new NS. In such a case, two issues were indentified [R4-2000220, R4-2003241]. One issue is if BS cannot know which NS values each of UEs can support, there would be connectivity issues for the cases of Pscell addition in NSA and handover in both SA and NSA. Another issus is that if BS cannot set appropriate NS to UE, then the UE may violate regulation.

To address this issue, WF [R4-2005738] approved the direction that BS should know which NS values each of the UEs can support, and listed possible solutions. In RAN4#95-e, it was approved to take Alt 1-2(Explicit signaling for a UE to report newly supported NS value(s) for a legacy band to the network (reuse modifiedMPR bits)) described in WF [R4-2009141]. By using Alt 1-2, connectivity issues can be avoided. In addition, it was also agreed that newly introduced NS is mandatory for UE brought into use at least after the changeover date, which can avoid the situation where UE may violate regulation.

In RAN4#97-e, CR was agreed to introduce NS\_203 and explicit signaling for a UE to report newly supported NS value(s) for a legacy band to the network through modifiedMPR bits [R4-2016785]. The description of modifiedMPRbehavior indication for NS\_203 is captured in table 7.5.4.1-4. Note that NS\_20X and NS\_20Y described in Table 7.5.4.1-3 have not yet been specified in TS 38.101-2 v15.14.0. The same approach with introduction of NS\_203 should apply to these NSs according to approved WF [R4-2009141], i.e., Alt 1-2(Explicit signaling for a UE to report newly supported NS value(s) for a legacy band to the network (reuse modifiedMPR bits)) should be used and newly introduced NS is mandatory for UE brought into use at least after the changeover date. And when these NSs should be introduced can be discussed in the future if requesed.

Table 7.5.4.1-4: *modifiedMPRbehavior* indication for NS\_203

|  |  |  |  |
| --- | --- | --- | --- |
| NR Band | Index of field  (bit number) | Definition  (description of the supported functionality if indicator set to one) | Notes |
| n258 | 0 | … | … |
|  | 1 | … | … |
|  | 2 | - NS\_203 as defined in clause 6.5.3.2.4 or both NS\_203 and CA\_NS\_203 as defined in clause 6.5A.3.2.4 of 38.101-2 v15.11.0 | - This bit shall be set to 1 by a UE supporting n258 or both n258 and CA\_n258 |

<Unchaged sections are omitted>