**3GPP TSG RAN Meeting #102 RP-23xxxx**

**Edinburgh, Scotland, December 11-15, 2023**

## Status Report to TSG

**Agenda item:** 9.3.1.7

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **WI / SI Name** | Enhanced support of reduced capability NR devices | | | | |
| included in this status report | Study Item:  No | Core part:  Yes | Performance part:  Yes | | Testing part:  No |
| **Acronym** | NR\_redcap\_enh | | | | |
| **Unique ID** | 970080 | | | | |
| **TSG Tdoc of latest approved WI/SI description (if any)** | [RP-232671](https://www.3gpp.org/ftp/tsg_ran/TSG_RAN/TSGR_101/Docs/RP-232671.zip) | | | | |
| **Target Completion Date**  **(indicate if changed)** | Study Item: | Core part: 12/2023 | Performance part: 06/2024 | Testing part: | |
| **Overall Completion level** | Study Item: | Core part:  100% | Performance Part: 0% | Testing part: | |

**Source:**

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| --- | --- | --- |
| **Leading WG** | | RAN1 |
| **Rapporteur** | **Name** | Johan BERGMAN |
| **Company** | Ericsson |
| **Email** | [johan.bergman@ericsson.com](mailto:johan.bergman@ericsson.com) |

## 1 Work plan related evaluation

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| --- | --- |
| **Do you want to modify the time budget for this WI/SI compared to what was endorsed at the last RAN meeting?** | No |

## 2. Detailed progress in RAN WGs since last TSG meeting

## 2.1 RAN1

#### 2.1.1 Agreements

##### 2.1.1.1 RAN1#114bis

To this meeting, 31 contributions were submitted, plus 16 contributions on the UE feature list (for details see agenda items 8.4 and 8.16.4 in [Tdoc list](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_114b/Docs/TDoc_List_Meeting_RAN1%23114-bis.xlsx)).

RAN1 carried out the following email discussions (with documents and agreements listed further down):

* [114bis-R18-RedCap], captured in [R1-2310568](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_114b/Docs/R1-2310568.zip)
* [114bis-R18-UE\_features-01], captured in [R1-2310617](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_114b/Docs/R1-2310617.zip)

At the end of the meeting,

* An updated RAN1 agreement summary was provided by the rapporteur in [R1-2310329](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_114b/Docs/R1-2310329.zip).
* An LS on UE features was sent to RAN2 and RAN3 in [R1-2310637](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_114b/Docs/R1-2310637.zip).

RAN1 made the following agreements related to **UE BB bandwidth reduction**:

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| --- | --- | --- |
| **Random access timeline**  Agreement:   * The following does not apply to FG 48-2 UEs for CFRA:   + RAR PDSCH timeline relaxation   Agreement:  Adopt the following TP for 38.213 clause 17.1A:   |  | | --- | | When  - a UE receives a PDSCH scheduled by a DCI format with CRC scrambled by a RA-RNTI or a MsgB-RNTI over a number of PRBs that is larger than 25 PRBs for 15 kHz SCS or larger than 12 PRBs for 30 kHz SCS, and  - the UE does not correctly receive the transport block provided by the PDSCH, or if the higher layers at the UE do not identify a RAPID associated with a corresponding PRACH transmission from the UE  if requested by higher layers, ~~T~~the UE shall be ready to transmit a PRACH no later than msec for 15 kHz SCS, or no later than msec for 30 kHz SCS, after the last symbol of the PDSCH reception, or after the last symbol of the window as described in Clauses 8.2 and 8.2A. |   Agreement:  For which (if any) of the following 2-step RACH cases, continue to discuss if there is a need to update the specifications to reflect the RAN1 agreement that RAR PDSCH timeline relaxation does not apply to FG 48-2 UEs for CFRA:   * Case 2a: Between reception of fallbackRAR and transmission of Msg3 * Case 2b: Between reception of successRAR and transmission of corresponding HARQ-ACK * Case 2c: Between reception of MsgB PDSCH scheduled by MSGB-RNTI in which UE does not correctly receive the transport block in the corresponding PDSCH within the window and transmission of only PRACH according to Type-1 random access procedure or to transmit both PRACH and PUSCH according to Type-2 random access procedure. * Case 2d: Between reception of MsgB PDSCH scheduled by MSGB-RNTI with RAPID which is not associated with the corresponding PRACH transmission from the UE and transmission of only PRACH according to Type-1 random access procedure or to transmit both PRACH and PUSCH according to Type-2 random access procedure.   **MBS bandwidth**  Agreement:   * For a UE with BB bandwidth reduction, for multicast MBS specified in Rel-17, the number of PRBs scheduled in DCI is not larger than 25/15 PRBs for 15/30 kHz SCS (irrespective of whether HARQ feedback is enabled or disabled).   Agreement:  Adopt the following TP for 38.213 clause 17.1A:   |  | | --- | | A UE that has not indicated FG 48-2 is not required to process a PDSCH reception in slot that is scheduled by a DCI format with CRC scrambled by a G-RNTI for broadcast or a MCCH-RNTI over a number of PRBs that is larger than 25 PRBs for 15 kHz SCS, or larger than 12 PRBs for 30 kHz SCS, when the PDSCH reception is with repetitions or when the UE receives another PDSCH in slot . |   **Simultaneous reception**  Agreement:   * An eRedCap UE with bandwidth reduction, depending on indicated UE capability, the UE can decode a PDSCH for MBS broadcast and a PDSCH for unicast with the two PDSCH partially or fully overlapping in time in non-overlapping PRBs, if the total number of PRBs does not exceed the maximum number of PRBs that the UE can receive or process per slot.   Agreement:   * An eRedCap UE with bandwidth reduction, depending on indicated UE capability, the UE can decode a PDSCH for MBS multicast and a PDSCH for unicast with the two PDSCH partially or fully overlapping in time in non-overlapping PRBs, if the total number of PRBs does not exceed the maximum number of PRBs that the UE can receive or process per slot.   Agreement:   * Continue to discuss whether and how to update the specification regarding the following aspect:   + simultaneous MBS broadcast/multicast and unicast when the total number of PRBs exceeds the maximum number of PRBs that the UE can receive or process per slot (if this is a valid case)   Conclusion:   * For an eRedCap UE (with or without UE BB bandwidth reduction), the following specification in 38.214 for simultaneous reception of MCCH PDSCH and PBCH still applies:   + The UE is expected to decode PDSCH scheduled with MCCH-RNTI and PBCH in PCell that partially or fully overlaps in time in non-overlapping PRBs in PCell.   **PDSCH/PUSCH bandwidth**  Agreement:   * Continue to discuss potential clarification of “A UE that has not indicated FG 48-2” in the paragraphs in 38.213 clause 17.1A * Continue to discuss potential clarification of “A UE that indicated FG 48-2” in the paragraphs in 38.213 clause 17.1A |

##### 2.1.1.2 RAN1#115

To this meeting, 32 contributions were submitted, plus 19 contributions on the UE feature list (for details see agenda items 8.4 and 8.16.4 in [Tdoc list](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_115/Docs/TDoc_List_Meeting_RAN1%23115.xlsx)).

RAN1 carried out the following email discussions (with documents and agreements listed further down):

* [115-R18-RedCap], captured in [R1-2312282](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_115/Docs/R1-2312282.zip)
* [115-R18-UE\_features-01], captured in [R1-2312584](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_115/Docs/R1-2312584.zip)

At the end of the meeting,

* An updated RAN1 agreement summary was provided by the rapporteur in [R1-2312283](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_115/Docs/R1-2312283.zip).
* An LS on MsgA PRACH early indication and peak rate related capability parameters was sent to RAN2 in [R1-2312618](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_115/Docs/R1-2312618.zip).
* An LS on UE features was sent to RAN2 and RAN3 in [R1-2312574](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_115/Docs/R1-2312574.zip).

RAN1 made the following agreements related to **UE BB bandwidth reduction**:

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| **Early indication**  Agreement:   * If MsgA PRACH early indication for Rel-17 RedCap UEs is configured, a Rel-18 eRedCap UE shall share the MsgA PRACH that is configured for Rel-17 RedCap UEs if the Rel-18 eRedCap UE performs 2-step RACH.   + Send LS to RAN2 to inform about this agreement.   Agreement:  Draft LS in [R1-2312617](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_115/Docs/R1-2312617.zip) is endorsed. Final LS is agreed in [R1-2312618](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_115/Docs/R1-2312618.zip).  **Msg3 PUSCH bandwidth**  Agreement:  Adopt the following TP for TS 38.213 clause 17.1A:   |  | | --- | | A UE ~~that indicated FG 48-2~~ does not expect to transmit a PUSCH over a bandwidth that is larger than 25 PRBs for 15 kHz SCS, or larger than 12 PRBs for 30 kHz SCS, per hop in a slot, where the PUSCH is scheduled by RAR UL grant or by a DCI scrambled by a TC-RNTI, or is configured for a Type-2 random access procedure. | | **Reason for change:** The formulation “A UE that indicated FG 48-2” may have ambiguous interpretation since the UE may not yet have indicated FG 48-2 when it transmits Msg3. | | **Summary of change:** Replace “A UE that indicated FG 48-2” with “A UE”. | | **Consequences if not approved:** Different interpretations of the current text may result in different implementations of the Msg3 PUSCH transmission for FG 48-2 UEs. |   **Simultaneous reception**  Agreement:  TP #3 below is endorsed for TS 38.214 clause 5.1:   |  | | --- | | For a reduced capability UE that indicates *supportOfRedCap-r18* but not indicating FG 48-2, if the UE is capable of receiving FDMed unicast and multicast/broadcast PDSCH per slot, the UE can decode the two PDSCHs, with the two PDSCHs partially or fully overlapping in time in non-overlapping PRBs,   * if the total number of PRBs allocated is no more than 25 PRBs when configured with SCS  = 0 or no more than 12 PRBs when configured with SCS  = 1, * otherwise the UE may skip decoding one of the two PDSCHs. | |

RAN1 made the following agreements related to **UE peak data rate reduction**:

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| Conclusion:  It is up to RAN2 to decide whether or not to change the current default values of the peak rate related UE capability parameters.  Send this conclusion in LS to RAN2.  Agreement:  Draft LS in [R1-2312617](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_115/Docs/R1-2312617.zip) is endorsed. Final LS is agreed in [R1-2312618](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_115/Docs/R1-2312618.zip). |

#### 2.1.2 Remaining Open issues

No remaining RAN1 issues

## 2.2 RAN2

#### 2.2.1 Agreements

##### 2.2.1.1 RAN2#123bis

To this meeting, 59 contributions were submitted (for details see agenda item 7.19 in [Tdoc list](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_123bis/Docs/TDoc_List_Meeting_RAN2%23123-bis.xlsx)).

RAN2 made the following agreements:

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| * Use the name *“supportOfERedCap-r18”* instead of *eRedCap-r18*, and align other capability names along these lines. * Capture “Enabling/disabling of frequency hopping for common PUCCH resources” in 306. * Add “as specified in Annex B2 in TS 38.331” after “BWP#0 configuration option 1. * Working assumption: No need to have separate cell barring for “eRedCap UE capable of 20MHz + PR1” and “eRedCap UE capable of BW3/PR3+ PR1” is confirmed as RAN2 agreement. * It is up to NW implementation to ensure that all partitions that the NW is interested to use to differentiate UEs. E.g. if the NW wants to be sure to be able to differentiate eRedCap and RedCap UEs, it would need to define all needed partitions for this. * Rel-18 eRedCap UE considers the set of configured RA resources with RedCap set to true as available for the RA procedure only when there is no set of configured RA resources with eRedCap set to true among all sets of configured RA resources. * It is specified in TS 38.331 that RRC determines that RedCap is applicable to the RA procedure for Rel-18 eRedCap UE only if there is no set of configured RA resources with eRedCap set to true among all sets of configured RA resources. In TS 38.321, no additional specification change is expected for Proposal 1 unless it is much simpler if we specify this in MAC. * RAN2 clarifies that eRedCap UEs do not support 60kHz SCS in FR1. * For eRedCap, RAN2 to specify UE capability transfer procedure to make UE capability filtering optional. * An eRedCap UE may ignore the capability filter received in the capability enquiry and send all supported bands in the mirrored UE capability filter. * RAN2 to discuss and adopt the TPs in the appendices A or B if Proposal 2 is agreed (i.e., UE behavior is captured (option A) by a NOTE or (option B) in procedural text). We will pick one of these options in the post-meeting email discussion. * The eRedCap UEs indicates explicitly with a bit in UE capability message whether the UE ignored the filter. * We leave the cross-layer indication to UE implementation. * This will be captured in MAC in the form of that “if <something happens>” but we will not specify anything with reference to PHY specs. * We adopt Option 1 in [R2-2309809](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_123bis/Docs/R2-2309809.zip). |

##### 2.2.1.2 RAN2#124

To this meeting, 51 contributions were submitted (for details see agenda item 7.19 in [Tdoc list](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_124/Docs/TDoc_List_Meeting_RAN2%23124.xlsx)).

RAN2 made the following agreements:

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| * Discuss in email disc for the CRs if/how to capture in the specs the case where eRedCap UEs are not supposed to use MsgA PUSCH resources if configured with a bandwidth larger than 5MHz. * eRedCap can be closed from RAN2 point of view. * To keep the name of parameters *extendedPagingCycle-r18*, *ran-ExtendedPagingCycle-r18*, and *ExtendedPagingCycle-Config-r18* unchanged. * Proposal 2: To change the name of parameter *extendedPagingPTW-r18* to *pagingPTWLength-r18* or just *pagingPTW-r18*. * Since a new feature priority has been introduced for Rel-18 eRedCap, i.e., *eRedCapPriority-r18*, we remove the corresponding EN in current RRC running CR. * As to the RRC running CR editor’s note, *cellBarredRedCap-r18* should be extended from *RedCap-ConfigCommonSIB-r17* (i.e. not to add *RedCap-ConfigCommonSIB-r18*)   2-step RACH:   * In case 2 (4-step PRACH eRedCap + 2-step PRACH RedCap), R18 eRedCap UE is allowed to select 2-step RA. If the R18 eRedCap UE selects 2-step RA, the R18 eRedCap UE performs 2-step RA by using the 2-step PRACH RedCap resources. In this case, if fallback from 2-step RA to 4-step RA is required (according to the current specification), the R18 eRedCap UE initiates 4-step RA by using the 4-step PRACH RedCap resources. * We will discuss how to capture this in the spec over email.   Capability filtering:   * We specify with normative wording how UE sets the mirrored filter. Use the TP in [R2-2312639](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_124/Docs/R2-2312639.zip) as baseline (Option B in the Tdoc), but limit it to eRedCap UEs   CFRA fallback and condition for *AdditionalRACH*:   * We attempt to implement in MAC the UE behaviour of CFRA to CBRA fallback for eRedCap UEs. If we find issues we may need to go the RRC way of defining a NW restriction. * We use TP-2 in [R2-2312408](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_124/Docs/R2-2312408.zip) as baseline for updating the *AdditionalRACH* condition   SON/MDT:   * We can discuss the memory requirements for RA-report and logged MDT report later as it is a capability-discussion.   LCID space:   * RAN2 confirms that separate LCIDs for CCCH1 and CCCH as Msg3/MSGA PUSCH early indication should be introduced. |

#### 2.2.2 Remaining Open issues

No remaining RAN2 issues

## 2.3 RAN3

#### 2.3.1 Agreements

##### 2.3.1.1 RAN3#121bis

To this meeting, 34 contributions were submitted (for details see agenda item 21 in [Tdoc list](https://www.3gpp.org/ftp/tsg_ran/WG3_Iu/TSGR3_121-bis/Docs/TDoc_List_Meeting_RAN3%23121-bis.xlsx)).

RAN3 agreed the following text proposals for **support of enhanced eDRX** and **support of eRedCap UEs**:

* [R3-235756](https://www.3gpp.org/ftp/tsg_ran/WG3_Iu/TSGR3_121-bis/Docs/R3-235756.zip) TP to F1AP: stage 3 issues fix.
* [R3-235757](https://www.3gpp.org/ftp/tsg_ran/WG3_Iu/TSGR3_121-bis/Docs/R3-235757.zip) TP to NGAP: stage 3 issues fix.
* [R3-235889](https://www.3gpp.org/ftp/tsg_ran/WG3_Iu/TSGR3_121-bis/Docs/R3-235889.zip) TP to XnAP: stage 3 issues fix.

RAN3 discussed the LS replies from SA2 and CT4 on signalling of data size over NGAP message for RAN paging, for purpose of MT-SDT paging with eDRX beyond 10.24 seconds. A reply LS was sent out in [R3-235765](https://www.3gpp.org/ftp/tsg_ran/WG3_Iu/TSGR3_121-bis/Docs/R3-235765.zip).

##### 2.3.1.2 RAN3#122

To this meeting, 36 contributions were submitted (for details see agenda item 21 in [Tdoc list](https://www.3gpp.org/ftp/tsg_ran/WG3_Iu/TSGR3_122/Docs/TDoc_List_Meeting_RAN3%23122.xlsx)).

RAN3 agreed the following text proposals for **support of enhanced eDRX** and **support of eRedCap UEs**:

* [R3-237815](https://www.3gpp.org/ftp/tsg_ran/WG3_Iu/TSGR3_122/Docs/R3-237815.zip) TP to NGAP: final stage 3 issues fix.
* [R3-237816](https://www.3gpp.org/ftp/tsg_ran/WG3_Iu/TSGR3_122/Docs/R3-237816.zip) TP to F1AP: final stage 3 issues fix.
* [R3-237817](https://www.3gpp.org/ftp/tsg_ran/WG3_Iu/TSGR3_122/Docs/R3-237817.zip) TP to TS 38.300: final stage 2 issues fix.
* [R3-237818](https://www.3gpp.org/ftp/tsg_ran/WG3_Iu/TSGR3_122/Docs/R3-237818.zip) TP to TS 38.470: final stage 2 issues fix.

On Data Size Information signalling over NGAP, RAN3 agreed to not proceed with any solution for Rel-18. Reply LS from SA2 needs to be checked when it is available.

#### 2.3.2 Remaining Open issues

No remaining RAN3 issues

## 2.4 RAN4

#### 2.4.1 Agreements

##### 2.4.1.1 RAN4#108bis

To this meeting, 39 contributions were submitted (for details see agenda item 5.31 in [Tdoc list](https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_108bis/Docs/TDoc_List_Meeting_RAN4%23108-bis.xlsx)).

RAN4 agreed a WF on **RF requirements for eRedCap UEs** in [R4-2317735](https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_108bis/Docs/R4-2317735.zip).

RAN4 made the following agreements related to **RRM requirements for enhanced eDRX** ([R4-2317365](https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_108bis/Docs/R4-2317365.zip)):

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| Transition requirements: transition between short INACTIVE eDRX (≤10.24s) and long INACTIVE eDRX (20.48s):   * When the UE transitions between any two states when changing eDRX\_IDLE cycle length, eDRX\_INACTIVE cycle length, INACTIVE RAN DRX length or changing PTW configuration, the UE shall meet the transition requirement, which is the less stringent requirement of the two requirements corresponding to the first state and the second state, during the transition time interval which is the time corresponding to the transition requirement. After the transition time interval, the UE shall meet the requirement corresponding to the second state.   Transition requirements: UE moves from a cell that supports and configures Rel-18 INACTIVE eDRX to a cell that supports only Rel-17 INACTIVE eDRX and vice versa:   * Do not define requirements for the scenario when UE moves from a cell that supports and configures Rel-18 INACTIVE eDRX to a cell that supports only Rel-17 INACTIVE eDRX and vice versa. |

RAN4 endorsed a big CR containing **all RRM requirements for enhanced eDRX** in [R4-2317438](https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_108bis/Docs/R4-2317438.zip).

##### 2.4.1.2 RAN4#109

To this meeting, 21 contributions were submitted (for details see agenda item 8.31 in [Tdoc list](https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_109/Docs/TDoc_List_Meeting_RAN4%23109.xlsx)).

RAN4 agreed a CR to add the **RF requirements for eRedCap UEs** in [R4-2321922](https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_109/Docs/R4-2321922.zip). In addition, RAN4 made this agreement:

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| * RAN4 agrees to consider discussions on the SAW-less design for eRedCap in Rel-19. |

RAN4 made the following agreements related to **RRM requirements for enhanced eDRX** ([R4-2321557](https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_109/Docs/R4-2321557.zip)):

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| * When configured with eDRX\_IDLE in IDLE/INACTIVE mode, the UE shall search every layer of higher priority at least every Thigher\_priority\_search = max(60, [1]\*eDRX\_IDLE cycle length) \* Nlayers seconds.   + RAN4 to discuss and confirm the value of [1] at RAN4#110 meeting. |

RAN4 agreed a big CR containing **all RRM requirements for enhanced eDRX** in [R4-2321367](https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_109/Docs/R4-2321367.zip).

#### 2.4.2 Remaining Open issues

Core part:

* No remaining RAN4 core part issues

Performance part:

* Specify necessary performance requirements, measurement accuracy requirements and test cases.

## 3. Detailed progress in SA/CT WGs since last TSG meeting

## 3.1 SAx/CTs

#### 3.1.1 Agreements with cross-TSG impacts

See RAN2 and RAN3 agreements in sections 2.2.1 and 2.3.1 of this status report.

#### 3.1.2 Remaining Open issues with cross-TSG impacts

The WI objective on enhanced eDRX in RRC\_INACTIVE requires SA2, CT1 and CT4 involvement.

## 4. References

RAN1#114bis

31 contributions (for details see agenda item 8.4 in [Tdoc list](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_114b/Docs/TDoc_List_Meeting_RAN1%23114-bis.xlsx))

16 contributions on the UE feature list (for details see agenda item 8.16.4 in [Tdoc list](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_114b/Docs/TDoc_List_Meeting_RAN1%23114-bis.xlsx))

RAN1#115

32 contributions (for details see agenda item 8.4 in [Tdoc list](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_115/Docs/TDoc_List_Meeting_RAN1%23115.xlsx))

19 contributions on the UE feature list (for details see agenda item 8.16.4 in [Tdoc list](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_115/Docs/TDoc_List_Meeting_RAN1%23115.xlsx))

RAN2#123bis

59 contributions (for details see agenda item 7.19 in [Tdoc list](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_123bis/Docs/TDoc_List_Meeting_RAN2%23123-bis.xlsx))

RAN2#124

51 contributions (for details see agenda item 7.19 in [Tdoc list](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_124/Docs/TDoc_List_Meeting_RAN2%23124.xlsx))

RAN3#121bis

34 contributions (for details see agenda item 21 in [Tdoc list](https://www.3gpp.org/ftp/tsg_ran/WG3_Iu/TSGR3_121-bis/Docs/TDoc_List_Meeting_RAN3%23121-bis.xlsx))

RAN3#122

36 contributions (for details see agenda item 21 in [Tdoc list](https://www.3gpp.org/ftp/tsg_ran/WG3_Iu/TSGR3_122/Docs/TDoc_List_Meeting_RAN3%23122.xlsx))

RAN4#108bis

39 contributions (for details see agenda item 5.31 in [Tdoc list](https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_108bis/Docs/TDoc_List_Meeting_RAN4%23108-bis.xlsx))

RAN4#109

21 contributions (for details see agenda item 8.31 in [Tdoc list](https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_109/Docs/TDoc_List_Meeting_RAN4%23109.xlsx))