**3GPP TSG RAN Meeting #100 Draft RP-230902**

**Taipei, June 12-14, 2023**

## Status Report to TSG

**Agenda item:** 9.3.1.7

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| --- | --- |
| **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-223544](https://www.3gpp.org/ftp/tsg_ran/TSG_RAN/TSGR_98e/Docs/RP-223544.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: 55%(RAN#99: 30%) | Performance Part:0%(RAN#99: 0%) | Testing part: |

**Source:**

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| --- | --- |
| **Leading WG** | RAN1 |
| **Rapporteur** | **Name** | Johan BERGMAN |
| **Company** | Ericsson |
| **Email** | 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#112bis-e

To this meeting, 43 contributions were submitted (for details see agenda item 9.6 in [Tdoc list](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_112b-e/Docs/TDoc_List_Meeting_RAN1%23112-bis-e.xlsx)).

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

* [112bis-e-R18-RedCap-01], captured in [R1-2304261](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_112b-e/Docs/R1-2304261.zip)

After the meeting, an updated RAN1 agreement summary was provided by the rapporteur in [R1-2303938](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_112b-e/Docs/R1-2303938.zip).

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

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| **SIB1/OSI bandwidth**Agreement:Update the agreements for SI PDSCH with the clarification as follows:* For UE BB bandwidth reduction, for SIB1 (PDSCH),
	+ Allow the scheduling of SIB1 to be larger than 5 MHz (as in legacy operation). The scheduling of SIB1 PDSCH is allowed to be larger than 25 PRBs for 15 kHz SCS and 12 PRBs for 30 kHz SCS.
* For UE BB bandwidth reduction, for broadcast OSI (PDSCH),
	+ Allow the scheduling of broadcast OSI (PDSCH) to be larger than 5 MHz (as in legacy operation). The scheduling of OSI PDSCH is allowed to be larger than 25 PRBs for 15 kHz SCS and 12 PRBs for 30 kHz SCS.

**Random access timeline and early indication**Agreement:Down-select one among the following options in RAN1#113:* Option 1:
	+ For the “FFS: value(s) of X”,
		- X = 0.5/0.25 ms for 15/30 kHz SCS
		- Note: Legacy default TDRA table and Δ are reused.
	+ A network-configurable additional separate early indication in Msg1 for Rel-18 eRedCap UEs is not supported.
		- When Msg1 indication for Rel-17 RedCap UEs is configured, it is used by Rel-18 eRedCap UEs (with or without UE BB bandwidth reduction).
* Option 2:
	+ For the “FFS: value(s) of X”,
		- X = 1/0.5 ms for 15/30 kHz SCS
		- Note: Legacy default TDRA table and Δ are reused.
	+ A network-configurable additional separate early indication in Msg1 for Rel-18 eRedCap UEs is not supported.
		- When Msg1 indication for Rel-17 RedCap UEs is configured, it is used by Rel-18 eRedCap UEs (with or without UE BB bandwidth reduction).
* Option 3:
	+ For the “FFS: value(s) of X”,
		- X = 1/0.5 ms for 15/30 kHz SCS
		- FFS: Whether legacy default TDRA table and Δ are reused.
	+ A network-configurable additional separate early indication in Msg1 for Rel-18 eRedCap UEs is supported.
		- When Msg1 indication for Rel-18 eRedCap UEs is configured, it is used by Rel-18 eRedCap UEs (with or without UE BB bandwidth reduction).
* Option 4:
	+ For the “FFS: value(s) of X”,
		- X = 0.5/0.25 ms for 15/30 kHz SCS
		- Note: Legacy default TDRA table and Δ are reused.
	+ A network-configurable additional separate early indication in Msg1 for Rel-18 eRedCap UEs is supported.
		- When Msg1 indication for Rel-18 RedCap UEs is configured, it is used by Rel-18 eRedCap UEs (with or without UE BB bandwidth reduction).

Agreement:The potential timeline relaxations for the following cases are FFS:* For 2-step RACH:
	+ Case 2a: Between reception of fallbackRAR and transmission of Msg3
	+ Case 2b: Between reception of successRAR and transmission of corresponding HARQ-ACK
* For 4-step RACH:
	+ Case 4a: Between reception of RAR PDSCH in which UE does not correctly receive the transport block and upcoming transmission of PRACH
	+ Case 4b: Between reception of RAR with RAPID which is not associated with the corresponding PRACH transmission and upcoming transmission of PRACH

**Msg4 bandwidth**Agreement:Confirm the following working assumption by assuming that Msg3 indication is available:* For UE BB complexity reduction, a UE is able to receive a Msg4 PDSCH resource allocation spanning a bandwidth of more than ~5 MHz per slot.
	+ The UE is not required to process a Msg4 PDSCH with a larger number of PRBs than 25 PRBs for 15 kHz SCS and 12 PRBs for 30 kHz SCS.

Agreement:[Draft] LS [R1-2304258](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_112b-e/Docs/R1-2304258.zip) is endorsed in principle with changing “to specify” to “to consider”.Final LS [R1-2304262](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_112b-e/Docs/R1-2304262.zip) is endorsed**Simultaneous reception**Conclusion:For UE BB bandwidth reduction, for autonomous SI acquisition, the following paragraph in TS 38.214 clause 5.1 still applies:* “The UE is expected to decode a PDSCH scheduled with C-RNTI, MCS-C-RNTI, or CS-RNTI during a process of autonomous SI acquisition.”
* FFS: Msg4 PDSCH scheduled by TC-RNTI case
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##### 2.1.1.2 RAN1#113

To this meeting, 37 contributions were submitted, plus 14 contributions on the UE feature list (for details see agenda items 9.6 and 9.16.8 in [Tdoc list](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_113/Docs/TDoc_List_Meeting_RAN1%23113.xlsx))

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

* [113-R18-RedCap], captured in [R1-2305959](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_113/Docs/R1-2305959.zip)
* [113-R18-UE\_features-01], captured in [R1-2306190](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_113/Docs/R1-2306190.zip)
* [Post-113-RRC], captured in [R1-2306267](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_113/Docs/R1-2306267.zip)

After the meeting,

* An updated RAN1 agreement summary was provided by the rapporteur in [R1-2306261](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_113/Docs/R1-2306261.zip).
* An LS on UE features was sent to RAN2 and RAN3 in [R1-2306225](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_113/Docs/R1-2306225.zip).
* An LS on RRC parameters was sent to RAN2 in [R1-2306270](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_113/Docs/R1-2306270.zip).

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

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| **Random access timeline and early indication**Agreement:* For the “FFS: value(s) of X”,
	+ X = 1/0.5 ms for 15/30 kHz SCS
* Legacy default TDRA table and Δ are reused.
* A network-configurable additional separate early indication in Msg1 for Rel-18 eRedCap UEs is supported.
	+ When Msg1 indication for Rel-18 eRedCap UEs is configured, it is used by Rel-18 eRedCap UEs (with or without UE BB bandwidth reduction).
* When Msg1 indication for Rel-18 eRedCap UEs is not configured while Msg1 indication for Rel-17 RedCap UEs is configured, Rel-18 eRedCap UEs shall share the PRACH that is configured for Rel-17 RedCap UEs.
	+ Note: Rel-18 eRedCap UEs will be differentiated from Rel-17 RedCap UEs based on Msg3 of Rel-18 eRedCap UEs.
* Additional early indication in MsgA PRACH is not supported.

Agreement:* For UE BB bandwidth reduction, the same timeline relaxation as for the Msg2-Msg3 timeline applies at least for the following cases:
	+ Case 4a: Between reception of RAR PDSCH in which UE does not correctly receive the transport block and upcoming transmission of PRACH
	+ Case 4b: Between reception of RAR with RAPID which is not associated with the corresponding PRACH transmission and upcoming transmission of PRACH

**MsgB bandwidth and 2-step RACH timeline**Agreement:For UE BB bandwidth reduction, for 2-step RACH, assuming that MsgA PUSCH indication is transmitted:* The bandwidth of a MsgB scheduled with MSGB-RNTI should be limited in a similar way as Msg2.
	+ The same timeline relaxation as for the Msg2-Msg3 timeline (i.e., 1 slot for Msg2 PDSCH larger than 25 PRBs for 15 kHz SCS and 12 PRBs for 30 kHz SCS) applies at least for the following cases:
		- Case 2a: Between reception of fallbackRAR and transmission of Msg3
		- Case 2b: Between reception of successRAR and transmission of corresponding HARQ-ACK
* The bandwidth of a MsgB scheduled with C-RNTI should be limited in a similar way as Msg4.

**Simultaneous reception**Agreement:* For UE BB complexity reduction, for RRC\_IDLE and RRC\_INACTIVE, there is no need to relax the requirements on simultaneous reception of two PDSCH transmissions for SIB1 / OSI / paging / RAR / Msg4 scheduled by TC-RNTI for the case when Msg4 PDSCH is not larger than 25 PRBs for 15 kHz SCS and 12 PRBs for 30 kHz SCS.
* Note: This means that the following paragraph in TS 38.214 clause 5.1 still applies for the case when Msg4 PDSCH is not larger than 25 PRBs for 15 kHz SCS and 12 PRBs for 30 kHz SCS:
	+ “The UE in RRC\_IDLE and RRC\_INACTIVE modes shall be able to decode two PDSCHs each scheduled with SI-RNTI, P-RNTI, RA-RNTI or TC-RNTI, with the two PDSCHs partially or fully overlapping in time in non-overlapping PRBs.”

Agreement:Down-select between these options for handling of simultaneous reception during P-RNTI triggered SI acquisition when the total number of PRBs for the PDSCH scheduled with SI-RNTI and the PDSCH scheduled with C-RNTI, MCS-C-RNTI, or CS-RNTI is larger than the maximum number of PRBs that the UE can process per slot.* Option 2: The UE may skip decoding of PDSCH [in slot n or n+1] scheduled with C-RNTI/MCS-C-RNTI/CS-RNTI but decodes SI PDSCH triggered by P-RNTI in slot n.
* Option 3: The prioritization between reception of PDSCH scheduled with C-RNTI/MCS-C-RNTI/CS-RNTI and SI PDSCH triggered by P-RNTI is up to the UE implementation.
* Option 4: During a process of P-RNTI triggered SI acquisition, the UE is not expected to [be scheduled PDSCH/to decode PDSCH scheduled] with C-RNTI/MCS-C-RNTI/CS-RNTI if in the same cell, another PDSCH scheduled with SI-RNTI partially or fully overlap in time.
* Option 7: No specification change
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RAN1 made the following agreement related to **UE peak data rate reduction**:

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| Agreement:* For UE peak data rate reduction with UE BB bandwidth reduction,
	+ The 10-Mbps peak rate target corresponds to a *vLayers*·*Qm*·*f* of 3.2
* For UE peak data rate reduction without UE BB bandwidth reduction,
	+ The 10-Mbps peak rate target corresponds to a *vLayers*·*Qm*·*f* of 0.75
	+ This is assuming 20 MHz bandwidth in the 38.306 peak rate expression.
* Note: This does not imply that downlink MIMO and 256 QAM are not supported
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#### 2.1.2 Remaining Open issues

Remaining RAN1 aspects for the following objectives:

* Further reduced UE complexity in FR1
	+ UE BB bandwidth reduction
	+ UE peak data rate reduction

Note: The progress in RAN1 would benefit from further guidance from RAN#100 regarding whether the 10-Mbps peak rate target in the endorsed RAN#99 proposal in [RP-230778](https://www.3gpp.org/ftp/tsg_ran/TSG_RAN/TSGR_99/Docs/RP-230778.zip) corresponds to a fixed peak rate target or a minimum peak rate target.

## 2.2 RAN2

#### 2.2.1 Agreements

##### 2.2.1.1 RAN2#121bis-e

To this meeting, 61 contributions were submitted (for details see agenda item 7.19 in [Tdoc list](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_121bis-e/Docs/TDoc_List_Meeting_RAN2%23121-bis-e.xlsx)).

RAN2 made the following agreements related to **enhanced eDRX in RRC\_INACTIVE**:

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| * Introduce an optional UE capability with signalling for Rel-18 enhanced eDRX in RRC\_INACTIVE.
* UE can support Rel-18 enhanced eDRX, only if it supports Rel-17 RRC\_IDLE eDRX. TBD if it must also support Rel-17 RRC\_INACTIVE eDRX.
* A cell can allow Rel-18 INACTIVE eDRX, only if eDRX-AllowedIdle is configured. TBD if it must also configure Rel-17 RRC\_INACTIVE eDRX.
* UEs configured with Rel-18 enhanced INACTIVE eDRX should apply Rel-18 enhanced INACTIVE eDRX if Rel-18 enhanced INACTIVE eDRX is allowed in the serving cell, regardless of whether Rel-17 INACTIVE eDRX is allowed in the serving cell.
* UEs configured with Rel-18 enhanced INACTIVE eDRX should apply INACTIVE DRX if both Rel-18 enhanced INACTIVE eDRX and Rel-17 INACTIVE eDRX are not allowed in the serving cell.
* Working assumption (pending specification complexity and NW complexity evaluation): UEs configured with Rel-18 enhanced INACTIVE eDRX should fall back to use Rel-17 INACTIVE eDRX (if capable and configured with Rel-17 INACTIVE eDRX) if the Rel-18 enhanced INACTIVE eDRX is not allowed but the Rel-17 INACTIVE eDRX is allowed by the current cell. gNB has the possibility to configure both Rel-17 INACTIVE eDRX and Rel-18 INACTIVE eDRX, allowing the UE to fall back to use Rel-17 INACTIVE eDRX.
* Introduce a new IE for INACTIVE eDRX to include the eDRX cycle values larger than 10.24s.
* Following cases are invalid:
	+ Case 1: UE is configured with a Rel-18 enhanced INACTIVE eDRX cycle but not configured with the IDLE eDRX cycle.
	+ Case 2: UE is configured with a Rel-18 enhanced INACTIVE eDRX cycle longer than the IDLE eDRX cycle.
* RAN PTW length is mandatorily present within Rel-18 INACTIVE eDRX’s configuration.
* Use the same UE\_ID\_H as IDLE eDRX for calculating the PH for RAN paging when INACTIVE eDRX is longer than 10.24s.
* Use TeDRX\_RAN instead of TeDRX\_CN to calculate the PH for RAN paging when TeDRX\_RAN is longer than 10.24s.
* For the overlapping PH, RAN PTW starting location is determined based on CN eDRX cycle.
* For the non-overlapping PH, PTW starting location for RAN PTW is determined based on the CN eDRX cycle.
* In an overlapped or non-overlapped PH: Within RAN PTW and outside CN PTW, T = RAN configured DRX cycle
* If this is even a valid case (we will decide later): In an overlapped PH: Within CN PTW and outside RAN PTW, T = min {CN configured DRX cycle, default paging cycle broadcast in system information}.
* In an overlapped PH: Within both CN PTW and RAN PTW, T = min {CN configured DRX cycle, RAN configured DRX cycle, default paging cycle broadcast in system information}.
* Legacy systemInfoModification-eDRX indication in Short message and eDRX modification boundaries are also applicable for Rel-18 UEs configured with INACTIVE eDRX > 10.24sec, and in this case, the CN eDRX cycle is used to compare with the modification period.
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RAN2 made the following agreements related to **further reduced UE complexity in FR1**:

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| * SIB1 should be able to indicate whether the cell enables access for eRedCap UEs or not (assuming that eRedCap UE is not allowed to access to the legacy cell nor the cell not supporting eRedCap). FFS on the relationship and granularity with the access control/cell barring purpose indication.
* A Rel-18 eRedCap UE should be able to indicate its support via new UE capability signaling specific to Rel-18 eRedCap.
* Introduce R18 eRedCap UE specific IFRI in SIB1.
* The new R18 eRedCap UE specific IFRI functionality works as follows:
	+ - Controls cell selection/reselection to intra-frequency cells for eRedCap UEs when this cell is considered barred by the eRedCap UE, as specified in TS 38.304 [20].
	+ - Working assumption (pending check in running CRs): If not present, an eRedCap UE treats the cell as barred, i.e., the UE considers that the cell does not support eRedCap.
* Introduce eRedcapAccessAllowed-r18 in *interFreqCarrierFreqList* in SIB4, about the frequency of neighbour cell supporting eRedCap, similar to R17.
* From RAN2 perspective, there is no need to introduce eRedCap UE specific initial BWP configuration (i.e. no R18 new field and at most one specific initial UL/DL BWP can be configured).
* If the R17 RedCap specific initial BWP is configured, eRedCap UEs always use it as its specific initial BWP (assuming no eRedCap UE specific initial BWP configuration field introduced).
* Working assumption: Use two new LCID values to support Msg3 early identification for eRedCap UE (can be revised and discussed together with other R18 WIs, if R18 WIs may occupy relatively many LCIDs).
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##### 2.2.1.2 RAN2#122

To this meeting, 60 contributions were submitted (for details see agenda item 7.19 in [Tdoc list](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_122/Docs/TDoc_List_Meeting_RAN2%23122.xlsx)).

RAN2 made the following agreements related to **enhanced eDRX in RRC\_INACTIVE**:

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| * UE can support Rel-18 INACTIVE eDRX (which comprises eDRX cycles and PTWs), even if it doesn’t support Rel-17 INACTIVE eDRX.
* A cell can allow Rel-18 INACTIVE eDRX (which comprises eDRX cycles and PTWs), even if it doesn’t allow Rel-17 INACTIVE eDRX, but the cell must allow IDLE eDRX.
* We confirm the working assumption: UEs configured with Rel-18 enhanced INACTIVE eDRX should fall back to use Rel-17 INACTIVE eDRX (if capable and configured with Rel-17 INACTIVE eDRX) if the Rel-18 enhanced INACTIVE eDRX is not allowed but the Rel-17 INACTIVE eDRX is allowed by the current cell. gNB has the possibility to configure both Rel-17 INACTIVE eDRX and Rel-18 INACTIVE eDRX, allowing the UE to fall back to use Rel-17 INACTIVE eDRX.
* A UE configured with Rel-18 INACTIVE eDRX will fall back to use INACTIVE RAN DRX if it is either not configured with Rel-17 INACTIVE eDRX or the cell does not allow Rel-18 INACTIVE eDRX and Rel-17 INACTIVE eDRX.
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RAN2 made the following agreements related to **further reduced UE complexity in FR1**:

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| * RAN2 confirms there can be cell(s) supporting Rel-18 eRedCap only, i.e., not allowing Rel-17 RedCap UE to camp and access.
* We introduce R18 versions of 1Rx and 2Rx barring bits and we don’t introduce a R18 version of the HD-FDD allowed-bit, i.e., the R17 HD-FDD allowed-bit is reused for and applied by R18 eRedCap UEs.
* All R18 eRedCap UEs uses the two new LCIDs for Msg3/MsgA PUSCH for CCCH/CCCH1 during Random Access, i.e., both those with peak rate reduction + BB BW reduction, and those with only peak rate reduction.
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#### 2.2.2 Remaining Open issues

Remaining RAN2 aspects for the following objectives:

* Enhanced eDRX in RRC\_INACTIVE (>10.24s)
* Further reduced UE complexity in FR1
	+ UE BB bandwidth reduction
	+ UE peak data rate reduction

## 2.3 RAN3

#### 2.3.1 Agreements

##### 2.3.1.1 RAN3#119bis-e

To this meeting, 29 contributions were submitted (for details see agenda item 21 in [Tdoc list](https://www.3gpp.org/ftp/tsg_ran/WG3_Iu/TSGR3_119bis-e/Docs/TDoc_List_Meeting_RAN3%23119-bis-e.xlsx)). A work plan was provided by the rapporteur in [R3-231641](https://www.3gpp.org/ftp/TSG_RAN/WG3_Iu/TSGR3_119bis-e/Docs/R3-231641.zip).

A summary of offline discussion is available in [R3-231948](https://www.3gpp.org/ftp/tsg_ran/WG3_Iu/TSGR3_119bis-e/Docs/R3-231948.zip).

RAN3 made the following agreements related to **enhanced eDRX in RRC\_INACTIVE**:

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| * NGAP agreements:
	+ Introduce a new *CN-based MT communication handling* IE ENUMERATED (Supported,…) in the *Core Network Assistance Information for RRC INACTIVE* IE in NGAP
	+ Introduce a new class 1 MT Communication Handling procedure in NGAP for RAN requesting CN to perform data buffering and for notifying of UE RRC state transition. The procedure contains the following messages:
		- MT COMMUNICATION HANDLING REQUEST
		- MT COMMUNICATION HANDLING RESPONSE
		- MT COMMUNICATION HANDLING FAILURE
	+ The MT COMMUNICATION HANDLING REQUEST message contains:
		- AMF UE NGAP ID (M)
		- RAN UE NGAP ID (M)
		- NR Paging eDRX Cycle for RRC INACTIVE (conditionally present if RRC state is set to ‘inactive’) encoded as ENUMERATED (hfquarter, hfhalf, hf1, hf2, hf4, hf8, hf16, hf32, hf64, hf128, hf256, hf512, hf1024, …).
	+ Introduce a new DL DATA NOTIFICATION class 2 message for AMF requesting RAN Paging
* XnAP agreements:
	+ Extend the *NR Paging eDRX Information for RRC INACTIVE* IE XnAP 9.2.3.162:
	+ Add new codepoints in the *NR Paging eDRX Cycle Inactive* IE: ENUMERATED (hfquarter, hfhalf, hf1, …,hf2, hf4, hf8, hf16, hf32, hf64, hf128, hf256, hf512, hf1024)
	+ add the *NR Paging Time Window* IE ENUMERATED (s1, s2, s3, s4, s5, s6, s7, s8, s9, s10, s11, s12, s13, s14, s15, s16, s17, s18, s19, s20, s21, s22, s23, s24, s25, s26, s27, s28, s29, s30, s31, s32,…)
* F1AP agreements:
	+ Extend the *NR Paging eDRX Information for RRC INACTIVE* IE F1AP 9.3.1.259:
	+ add new codepoints in the *NR Paging eDRX Cycle Inactive* IE: ENUMERATED (hfquarter, hfhalf, hf1, …, hf2, hf4, hf8, hf16, hf32, hf64, hf128, hf256, hf512, hf1024)
	+ add the *NR Paging Time Window* IE ENUMERATED (s1, s2, s3, s4, s5, s6, s7, s8, s9, s10, s11, s12, s13, s14, s15, s16, s17, s18, s19, s20, s21, s22, s23, s24, s25, s26, s27, s28, s29, s30, s31, s32, …)
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The following Text Proposals were agreed:

* TP for TS38.413 Introduction of MT Communication Handling Request and DL Data Notification in [R3-231949](https://www.3gpp.org/ftp/tsg_ran/WG3_Iu/TSGR3_119bis-e/Docs/R3-231949.zip)
* TP for TS38.410 Introduction of MT Communication Handling Request and DL Data Notification in [R3-232126](https://www.3gpp.org/ftp/tsg_ran/WG3_Iu/TSGR3_119bis-e/Docs/R3-232126.zip)
* (TP to 38.423) Introduction on NR Redcap enhancement in [R3-231962](https://www.3gpp.org/ftp/tsg_ran/WG3_Iu/TSGR3_119bis-e/Docs/R3-231962.zip)
* (TP to 38.473) Introduction on NR Redcap enhancement in [R3-231963](https://www.3gpp.org/ftp/tsg_ran/WG3_Iu/TSGR3_119bis-e/Docs/R3-231963.zip)
* (TP to 38.300) Introduction on NR Redcap enhancement in [R3-231964](https://www.3gpp.org/ftp/tsg_ran/WG3_Iu/TSGR3_119bis-e/Docs/R3-231964.zip)

RAN3 sent an LS to SA2 in [R3-231951](https://www.3gpp.org/ftp/tsg_ran/WG3_Iu/TSGR3_119bis-e/Docs/R3-231951.zip) on RAN3 progress to address remaining Editor’s Notes in TS 23.502.

##### 2.3.1.2 RAN3#120

To this meeting, 22 contributions were submitted (for details see agenda item 21 in [Tdoc list](https://www.3gpp.org/ftp/tsg_ran/WG3_Iu/TSGR3_120/Docs/TDoc_List_Meeting_RAN3%23120.xlsx)). A work plan was provided by the rapporteur in [R3-233061](https://www.3gpp.org/ftp/TSG_RAN/WG3_Iu/TSGR3_120/Docs/R3-233061.zip).

A summary of offline discussion is available in [R3-233331](https://www.3gpp.org/ftp/tsg_ran/WG3_Iu/TSGR3_120/Docs/R3-233331.zip).

RAN3 made the following agreements related to **enhanced eDRX in RRC\_INACTIVE**:

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| RRC State indication is not needed in the MT COMMUNICATION HANDLING REQUEST message when indicating of UE connection resumeAdd a CHOICE structure in the MT COMMUNICATION HANDLING REQUEST:* Activate HLCOM
	+ NR RAN Paging eDRX Cycle for RRC INACTIVE
	+ NR RAN PTW length
* Deactivate HLCOM
	+ Deactivate HLCOM indication

RAN3 agrees that AMF sends the assistance information PPI, ARP, PDU session ID and QFI in the DL DATA NOTIFICATION message to NG-RAN node to decide the paging priority. FFS on 5QI. |

The following Text Proposal was agreed:

* (TP for TS 38.413) Update of CN based Communication Handling in [R3-233344](https://www.3gpp.org/ftp/tsg_ran/WG3_Iu/TSGR3_120/Docs/R3-233344.zip)

RAN3 sent an LS to SA2 and CT4 in [R3-233347](https://www.3gpp.org/ftp/tsg_ran/WG3_Iu/TSGR3_120/Docs/R3-233347.zip) to provide progress update and ask if feasible to provide DL Data size to NG-RAN during the DL DATA NOTIFICATION for the purpose of MT-SDT paging decision.

#### 2.3.2 Remaining Open issues

Remaining RAN3 aspects for the following objectives:

* Enhanced eDRX in RRC\_INACTIVE (>10.24s)

## 2.4 RAN4

#### 2.4.1 Agreements

##### 2.4.1.1 RAN4#106bis-e

To this meeting, 25 contributions were submitted (for details see agenda item 5.32 in [Tdoc list](https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_106bis-e/Docs/TDoc_List_Meeting_RAN4%23106-bis-e.xlsx)).

* The WF ([R4-2306638](https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_106bis-e/Docs/R4-2306638.zip)) is agreed for eRedCap RF core work.
* The WF ([R4-2306365](https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_106bis-e/Docs/R4-2306365.zip)) is agreed for eRedCap RRM core work.

RAN4 made the following agreements related to RF requirements for **further reduced UE complexity in FR1**:

|  |
| --- |
| New FRC for maximum input level test* Further work on specifying one new FRC with 64QAM modulation order
	+ FFS on the details for FRC in the future meeting.

New DL FRC* Modify the DL FRC table(s) to accommodate 25RB with 15 kHz SCS for 10, 15, 20MHz and 12RB with 30 kHz SCS for 10, 15, 20MHz
	+ FFS on the details

UL RMC* There is no need to further update the UL RMC specified in A.2 for R18 RedCap

5MHz REFSENS for wider channel BW (FDD band) * Down-selection from option 2b and option 3.
	+ Option 2b: Not limit the RB allocation position, scaling the REFSENS from respective wider channel bandwidth
	+ Option 3: Limit the RB allocation position
		- Use the 5MHz REFSENS PRB allocations for all channel BW wider than 5MHz, and with both UL and DL allocations centered around the channel bandwidth to minimize the REFSENS impact from UL self-interference.
		- Further reference sensitivity degradation may need to be allowed for bands with narrow duplex spacing even if RBs are placed in the middle of the channel.

60kHz SCS* Wait RAN1 progress on 60kHz RB limitation

BS RF requirement* There is no impact to BS RF requirements from Rel-18 enhanced RedCap
 |

RAN4 made the following agreements related to RRM requirements for **enhanced eDRX in RRC\_INACTIVE**:

|  |
| --- |
| Extended eDRX range requirements in RRC INACTIVE * INACTIVE state requirements for eDRX cycle > 10.24 sec
	+ The sample number needed to perform the serving cell and intra/inter-frequency neighbor cell detection/evaluation/measurements for corresponding IDLE mode eDRX cycles can be reused for INACTIVE mode eDRX cycles.

When configured with both IDLE and INACTIVE eDRX configurations for serving cell measurements* Wait for the RAN2 decisions on the T value and PTW length design before defining serving cell measurements requirements

When configured with both IDLE and INACTIVE eDRX configurations for neighbour cell measurements* The detection/measurement/evaluation delay requirements for intra-frequency/inter-frequency neighbour cells shall be specified in the step of:
	+ INACTIVE eDRX cycle, if the eDRX\_Inactive=2.56/5.12/10.24sec
	+ FFS if eDRX\_Inactive ≥ 20.48sec

When to measure when configured with both IDLE and INACTIVE eDRX configurations larger than 10.24s for serving cell measurements* Measurements/evaluation period shall be constrained to be within a single PTW irrespective of whether IDLE or INACTIVE eDRX PTW is being used.
	+ Note: Wait for the RAN2 decisions on the T value and PTW.

When to measure when configured with both IDLE and INACTIVE eDRX configurations larger than 10.24s for neighbour cell measurements* The number of samples needed for Tdetect,NR of intra-freq or inter-freq cell measurement (measured in DRX cycles) may belong to more than one PTW.

When to measure when IDLE and INACTIVE eDRX PTW do not coincide* RAN4 to wait for RAN2 progress to discuss following:
	+ Whether to clarify the measurement behavior when the PTWs of IDLE and INACTIVE states are not coinciding.

Transition requirements * RAN4 to discuss the need for transition requirements (UE behavior and corresponding requirement for the transition between short INACTIVE eDRX (≤10.24sec) and long INACTIVE eDRX(≥20.48sec)) after the INATIVE eDRX with PTW requirements are finalized.

CG-SDT requirements with PTW* FFS whether to define requirements for CG-SDT for Rel-18 eRedCap UE with PTW

CG-SDT requirements with PTW: RSRP2 time range * Following option is to be discussed after RAN4 has identified whether new requirements are to be specified for Rel-18 eRedCap with PTW:
	+ RSRP2 time range in FR1 with eDRX cycle > 10.24 sec is defined as (T2 –640ms) ≤ T2’ ≤ T2.

Applicability of Rel-17 RLM/BFD relaxation requirements to Rel-18 RedCap* Since relaxation of relaxed RLM/BFD does not belong to any of the Rel-18 RedCap objectives, and there is no consensus to develop those within Rel-18 WI scope, this issue is closed, and no more discussions needed.
 |

RAN4 made the following agreements related to RRM requirements for **UE BB bandwidth reduction**:

|  |
| --- |
| Impact on CGI reading requirements* FFS whether to define CGI reading requirements for Rel-18 eRedCap UEs
* If CGI reading requirements for Rel-18 eRedCap UEs are introduced
	+ If SIB1 is scheduled within 5MHz BW
		- Reuse existing requirements for SIB1 reading for the case
	+ FFS for the requirements for the case of SIB1 scheduled with BW > 5MHz

Impact on paging requirements * No impact on paging reception requirements due to baseband BW reduction.

Impact on THARQ* There is not any impact on THARQ due to baseband BW reduction.
 |

##### 2.4.1.2 RAN4#107

To this meeting, 20 contributions were submitted (for details see agenda item 8.32 in [Tdoc list](https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_107/Docs/TDoc_List_Meeting_RAN4%23107.xlsx)).

* The WF ([R4-2310497](https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_107/Docs/R4-2310497.zip)) is agreed for eRedCap RF core work.
* The WF ([R4-2310154](https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_107/Docs/R4-2310154.zip)) is agreed for eRedCap RRM core work.

RAN4 made the following agreements related to RF requirements for **further reduced UE complexity in FR1**:

|  |
| --- |
| New FRC for maximum input level test* Wait RAN1/RAN-P to further clarify the peak data rate, delay any discussion around FRC relating to the peak data reduction.

Separate requirement or same requirement * To define separate requirements for two types of eRedCap UE could be considered in RAN4
	+ Assuming the different types of eRedCap UE has different hardware implementations

Requirement for eRedCap (20MHz + PR1)* Apply Rel-17 RedCap RF requirements to eRedCap (20MHz+PR1)
	+ FFS on FRC issue for maximum input level requirements
 |

RAN4 made the following agreements related to RRM requirements for **enhanced eDRX in RRC\_INACTIVE**:

|  |
| --- |
| How to specify the requirements when configured with both IDLE and INACTIVE eDRX configurations for serving cell measurements* The requirement shall be specified based on T like in R17 Inactive mode requirement with eDRX, and T can be referred to RAN2 definition in TS38.304.

Measurement period when configured with both IDLE and INACTIVE eDRX configurations for neighbour cell measurements* The detection/measurement/evaluation delay requirement are specified in the step of:
	+ RAN configured DRX cycle, if eDRX\_Inactive ≥ 20.48sec

When to measure when configured with both IDLE and INACTIVE eDRX configurations larger than 10.24s for neighbour cell measurements* UE shall perform measurements/evaluation of neighbor cell within single PTW irrespective of IDLE or INACTIVE PTW being used.

When to measure when configured with both IDLE and INACTIVE eDRX configurations larger than 10.24s and when the PTWs are partially overlapping for serving and neighbour cell measurements* UE performs measurements during:
	+ Option 1a: Max (RAN PTW, CN PTW)
		- Prioritize measurement time during the PTW at the cost of increase UE complexity.
	+ Option 1b: Min (RAN PTW, CN PTW)
		- Prioritize UE complexity at the cost of reduced measurement time.
	+ Option 1c: RAN PTW
	+ Other options are not precluded

When to measure when IDLE and INACTIVE eDRX PTW do not coincide* Option 1: RAN4 to agree that UE follows the INACTIVE eDRX when IDLE and INACTIVE eDRX PTWs do not coincide
* Option 2: No need to define requirements for the case when PTWs do not coincide.

Transition requirements * Option 1: RAN4 to define requirement for the transition between short INACTIVE eDRX (≤10.24sec) and long INACTIVE eDRX(≥20.48sec).
* Option 2: No need to define new transition requirements for transition between short INACTIVE eDRX (≤10.24sec) and long INACTIVE eDRX(≥20.48sec).

Issue 1-8: CG-SDT requirements with PTW * Do not define specific CG-SDT requirements with PTW
* Reuse the existing CG-SDT requirements
* It is RAN4 understanding that UE is allowed to make CG-SDT transmission either inside or outside PTW based on CG-SDT network configuration
 |

RAN4 made the following agreement related to RRM requirements for **UE BB bandwidth reduction**:

|  |
| --- |
| Whether to define CGI reading requirements for Rel-18 RedCap UE* No CGI reading related requirements are specified for R18 RedCap when SIB1 is scheduled with BW > 5 MHz.
 |

#### 2.4.2 Remaining Open issues

Core part:

* Define RRM requirements for enhanced eDRX in RRC\_INACTIVE (>10.24s)
* Define RF requirements for further enhanced UE complexity in FR1 (for details see WF in [R4-2310497](https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_107/Docs/R4-2310497.zip))

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#112bis-e

43 contributions (for details see agenda item 9.6 in [Tdoc list](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_112b-e/Docs/TDoc_List_Meeting_RAN1%23112-bis-e.xlsx))

RAN1#113

37 contributions (for details see agenda item 9.6 in [Tdoc list](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_113/Docs/TDoc_List_Meeting_RAN1%23113.xlsx))

14 contributions on the UE feature list (for details see agenda item 9.16.8 in [Tdoc list](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_113/Docs/TDoc_List_Meeting_RAN1%23113.xlsx))

RAN2#121bis-e

61 contributions (for details see agenda item 7.19 in [Tdoc list](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_121bis-e/Docs/TDoc_List_Meeting_RAN2%23121-bis-e.xlsx))

RAN2#122

60 contributions (for details see agenda item 7.19 in [Tdoc list](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_122/Docs/TDoc_List_Meeting_RAN2%23122.xlsx))

RAN3#119bis-e

29 contributions (for details see agenda item 21 in [Tdoc list](https://www.3gpp.org/ftp/tsg_ran/WG3_Iu/TSGR3_119bis-e/Docs/TDoc_List_Meeting_RAN3%23119-bis-e.xlsx))

RAN3#120

22 contributions (for details see agenda item 21 in [Tdoc list](https://www.3gpp.org/ftp/tsg_ran/WG3_Iu/TSGR3_120/Docs/TDoc_List_Meeting_RAN3%23120.xlsx))

RAN4#106bis-e

25 contributions (for details see agenda item 5.32 in [Tdoc list](https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_106bis-e/Docs/TDoc_List_Meeting_RAN4%23106-bis-e.xlsx))

RAN4#107

20 contributions (for details see agenda item 8.32 in [Tdoc list](https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_107/Docs/TDoc_List_Meeting_RAN4%23107.xlsx))