3GPP TSG-RAN WG2 Meeting #122 [R2-2306542](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2306542.zip)

Incheon, Korea, May 22-26, 2023

**Agenda item: 9.2**

**Source: Vice Chairman (Nokia)**

**Title: Report on LTE legacy, XR, QoE and MUSIM**

**Document for: Approval**

# Organizational

Rel-17 CR

- From R2 121, Rel-17 CRs are treated as normal (as Rel-16 Rel-15 etc), meaning that submitted CRs are agreed/not agreed individually.

- Chair Observation: As for Rel-16 Rel-15 rapporteurs may still do Rel-17 “rapporteur CRs” for miscellaneous small corrections. The work on Rapporteur CRs in normal maintenance phase is usually organized by TS rapporteurs (for maintenance in breakout sessions may alternatively be by WI rapporteur or other appointed).

Rel-17 UE capabilities

- Also for UE capabilities, normal CRs handling is planned, i.e. CRs should be per-WI and no planned merge into mega CRs. However, if it makes sense from some perspective, multi-WI CRs are not precluded (dec case by case).

Tdoc limitations

Tdoc limitations doesn’t apply to Rapporteur Input, i.e.

- Assigned summary rapporteur input of the summary.

- Email / offline discussions outcomes by discussion rapporteur,

- WI rapporteurs input for WI planning etc,

- TS rapporteur input for TS maintenance

- Contact Company of a LSin that triggers RAN2 action may submit one tdoc to facilitate the LS reply. This only applies to one of the contact companies in case there are several (default the first).

Tdoc limitations doesn’t apply to Input created at the meeting, revisions, assigned documents etc.

Tdoc limitations doesn’t apply to shadow / mirror CRs (Cat A), or In-Principle Agreed CRs.

Tdoc limitations applies to all other submitted tdocs (e.g. discussion tdoc and CR tdoc are counted as two).

**List of offline email discussions:**

**NOTE: the email discussion deadlines are meant to allow at least all regions to have one day to comment (other than weekend) and also give rapporteurs time to update their proposals before the meeting)**

**Email discussion deadlines**

**NOTE: No AT-meeting email discussion reports will be handled in sessions happening during Mon-Wed.**

**Deadline 1 (discussions for Thu online)**

* **Comment deadline:** Thursday W1, 0900 local time (for collecting views)
* **Rapporteur proposed outcome:** Thursday, 1200 local time (proposed outcome)
* **Document deadline:** 1h before session (discussion report)

**Deadline 2 (LS/CR approval via email):**

* **Comment deadline:** Friday, 0800 local time (for wording proposals)
* **Rapporteur proposed outcome:** EOM (approved LS or agreed CR)

**Organizational**

* [AT122][200] Organizational – LTE legacy, XR, QoE and MUSIM (RAN2 VC)

Scope:

* + - Share plans for the meetings and list of ongoing email discussions for the sessions
		- Share meetings notes and agreements for review and endorsement
		- Flag LSs and in-principle agreed CRs for discussion

      Intended outcome:

* + - General information sharing about the sessions

**Post-meeting email discussions**

**AT-meeting offline discussions (started only after online session)**

**Dates and deadlines – Technical Meeting (see also RP-230050)**

May 12th 1000 UTC General Tdoc Submission Deadline.

June 2nd 1000 UTC Deadline Short Post Email Discussions

**RAN2-122 Session Schedule**

NOTE that this schedule may be modified on short notice.
Some Expectations: Details may be added every day. The Schedule for CBs on Thursday (and Friday) will be updated on Wednesday, and the schedule for CBs on Friday will be further updated on Thursday.

**WEEK 1**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Main room** | **Brk 1 room** | **Brk 2 room** | **Brk 3 room** |
| **Monday May 22**  |
| 09:00 – 10:30 | Opening:[1], [2], [3] 20-25 minNR1516 CP (Johan)- Common [5.1.1] [5.1.3]NR17 (Johan)- Common [6.1.1] [6.1.3.0, 6.1.3.1, 6.1.3.3]: In the order: General, 71GHz, feMIMO, TEI, Slicing, ePowSav, MGE, RedCap, QoE, DCCA, [6.1.3.2] UE cap  | Breakout to start after formal opening of meeting and NR CPUP - common items if any in the main room:NR151617 UP (Diana)NR18 MT-SDT [0.5] (Diana)NR18 Network Energy Saving [1] (Diana)- DTX/DRX, - SSB-less (if time allows) | Breakout to start after formal opening of meeting in main room:NR17 Pos (Nathan)NR17 SL Relay (Nathan) - UP items if time permits  |  |
| 11:00 – 13:00 |
| 14:30 – 16:30 | NR18 UAV [1] (Diana)- measurement reporting, - flight path, - BRID (if time allows) | NRLTE1516 (Kyeongin)NR17 (Kyeongin) |
| 17:00 – 19:00 | NR17 (Johan)- Common[6.1.1] [6.1.3] SDT, IABNR18 MIMO evo [0.5] (Erlin)- 7.20.1 (if any)- 7.20.2 | NR18 NTN enh [1] (Sergio) | NR18 SL evolution [1] (Kyeongin) |
| **Tuesday May 23** |
| 08:30 – 10:30 | NR18 LP WUS [0.5] (Johan)NR18 fCovEnh [0.5] (Eswar)* Start with Stage-2 CP issues (7.21.2) after organizational
	+ CBRA open issues, CFRA support, RSRP thresholds etc
* UP issues (7.21.3)
	+ fallbacks

Stage-3 CP issues if time left (how to signal partitions, priorities and capability etc) | NR17 MBS (Dawid) 8:30-10:00- 6.2.0, 6.2.1 (CP), 6.2.2 (UP)NR18 eQoE [0.5] (Tero) 10:00-10:30- 7.14.2: Area scope (e.g. [R2-2306396](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2306396.zip)), release of QoE data (e.g. [R2-2305809](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2305809.zip)) | NR17 (Nathan) - Pos SL Relay TBD |  |
| 11:00 – 13:00 | NR17 NTN Maint (Sergio) | NR18 eQoE [0.5] (Tero) - 7.14.2: RRC state applicability, SIB information and UE buffer sizes (e.g. [R2-2305076](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2305076.zip), [R2-2305310](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2305310.zip)), UE capabilities ([R2-2305606](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2305606.zip))- 7.14.3: Need for RVQoE events in RRC (e.g. [R2-2306109](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2306109.zip), [R2-2305384](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2305384.zip)), LS replies to RAN3/SA4 (e.g. [R2-2305077](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2305077.zip))EUTRA16+ (Tero) 12:30-13:00- 4.1: HO completion in Stage-2 ([R2-2304943](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2304943.zip)), QoE configuration release ([R2-2306539](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2306539.zip), [R2-2305132](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2305132.zip)) | NR18 Pos [2] (Nathan) |
| 14:30 – 16:30 | NR18 Other [2] (Johan) | NR18 XR [2] (Tero)- 7.5.1: LSs, rapporteur input, running CR(s)- 7.5.4.1: Delay reporting (e.g. [R2-2304955](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2304955.zip)), BSR tables for XR ([R2-2305149](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2305149.zip), [R2-2304711](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2304711.zip)), support of piecewise linear BSR table ([R2-2305604](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2305604.zip))- 7.5.4.2: Discard operation for XR (e.g. [R2-2305019](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2305019.zip), [R2-2305191](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2305191.zip), [R2-2305784](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2305784.zip)) | NR18 SL relay [1.5] (Nathan)- |
| 17:00 – 19:00 | NR18 feMob [2] (Johan) | NR18 XR [2] (Tero)- 7.5.3: Non-integer periodicity for DRX (e.g. [R2-2304709](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2304709.zip), [R2-2304808](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2304808.zip)), SFN wrap-around ([R2-2304710](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2304710.zip), [R2-2305898](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2305898.zip)) - 7.5.2: UL jitter signaling (e.g. [R2-2304708](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2304708.zip), [R2-2305634](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2305634.zip), [R2-2305827](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2305827.zip)), UL EoDB detection at gNB (e.g. [R2-2305190](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2305190.zip), [R2-2305897](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2305897.zip))- 7.5.4.3: Retransmissionless, CG (e.g. [R2-2304809](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2304809.zip), [R2-2305654](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2305654.zip)), RAN2 aspects of RAN1 CG enhancements ([R2-2304713](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2304713.zip), [R2-2306185](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2306185.zip)) | NR17 (Nathan) NR18 SL relay [1.5] (Nathan) |
| **Wednesday May 24** |
| 08:30 – 10:30 | NR18 feMob [2] (Johan) | NR18 NCR [0.5] (Sasha) | NR18 Pos [2] (Nathan) |  |
| 11:00 – 13:00 | NR18 Mobile IAB [0.5] (Johan)NR18 Other [2] (Johan) | NR18 RedCap [1] (Mattias) | NR17 SONMDT (HuNan) |
| 14:30 – 16:30 | NR18 URLLC [0.5] (Diana)NR18 Network Energy Saving [1] (Diana)- Mobility, - Cell reselection | NR17 MBS (Dawid)- Continuation, if neededNR 18 MBS [0.75] (Dawid)- 7.11.1 (Organizational)- 7.11.3 (Shared processing)- 7.11.2.1 (CP issues for INACTIVE) | NR18 SONMDT [1] (HuNan) |
| 17:00 – 19:00 | NR18 AIML [1] (Johan) | R18 IoT-NTN [1] (Sergio) | NR18 IDC [1] (Yi) |
| **Thursday May 25** |
| 08:30 – 10:30 | CB NR151617 (Johan) | CB Diana- maintenance CRs, - NES CBs .  | CB Kyeongin |  |
| 11:00 – 13:00 | NR18 TEI [1] (Nathan, Johan)No SL Relay proposals.  | CB Diana- NES CBs- UAV CBs and subscription based AI.  | CB Kyeongin |
| 14:30 – 16:30 | CB NR17 (Johan) | CB Sergio (14:30-15:30)(including AI 7.25.4, in case there is any corresponding progress in RAN1)CB Tero (15:30 – 16:30)- NR18 eQoE leftovers and CBs- 7.14.4: SRB configuration (e.g. [R2-2306477](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2306477.zip), [R2-2305810](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2305810.zip)), MN RRC message used for QoE reporting to SN (e.g. [R2-2305383](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2305383.zip)) | CB Nathan |
| 17:00 – 19:00 | CB NR17 (Johan)CB NR18 (Johan) | CB Tero- 4.1: LTE CBs (if any)- 7.5.X: XR leftovers and CBs (TBD based on progress on Tuesday) | CB Nathan |
| **Friday May 26** |
| 08:30 – 10:30 | NR18 MIMO evo [0.5] (Erlin)- CBs from 7.20.2 (if any), - 7.20.3. CB Dawid | CB Mattias TBD | CB Nathan, Kyeongin TBD |  |
| 11:00 – 13:00 | CB Johan, Eswar TBD | CB Sergio | CB Yi |
| 14:30 – 16:00 | CB Johan  | CB Sasha, Tero | CB HuNan |
| 16:00 – 17:00 | CB and conclusion (Johan) |  |  |  |

**Breaks**

Morning coffee: 10:30 to 11:00

Lunch: 13:00 to 14:30

Afternoon coffee: 16:30 to 17:00

**Offline Web Conference Schedule**

Number Title Day/Time Place Coordinator

# 4 EUTRA Rel-17 and earlier

Only essential corrections. No documents should be submitted to 4. Please submit to 4.x

## 4.1 EUTRA corrections Rel-17 and earlier

(NB\_IOTenh4\_LTE\_eMTC6-Core; leading WG: RAN1; REL-17; WID: RP-211340)

(UPIP\_EN-DC\_UE; leading WG: RAN3; REL-17; WID: RP‑213669)

(LTE TEI17)

Essential corrections to LTE Rel-17 topics not covered by other agenda items.

(NB\_IOTenh3-Core; leading WG: RAN1; REL-16; started: Jun 18; Completed: June 20; WID: RP-200293); REL-15 and Earlier NB-IoT WIs are in scope but not listed explicitly (long list).

(LTE\_eMTC5-Core; LTE\_eMTC5-Core; leading WG: RAN1; REL-16; started: Jun 18; Completed: June 20; WID: RP192875;), REL-15 and Earlier eMTC WIs are in scope but not listed explicitly (long list).

(LTE\_feMob-Core; leading WG: RAN2; REL-16; started: Jun 18; Completed: June 20; WID: RP-190921);

(LTE\_terr\_bcast-Core, LTE\_DL\_MIMO\_EE-Core, LTE\_high\_speed\_enh2-Core; LTE TEI16 Non-positioning);

REL-15 and Earlier EUTRA WIs are in scope but not listed explicitly (long list), Except V2X and Sidelink WIs and Positioning WIs, which are adressed by AIs below.

NOTE that LTE corrections related to NR WIs or Joint NR LTE WIs should be submitted to NR AIs below.

NOTE that LTE corrections which are the same as an NR correction should be submitted to the respective NR AI (so the NR CR and LTE CR can be treated together).

This Agenda Item is treated in the EUTRA Breakout session

Online (Tuesday) (1)

LTE Rel-8 Stage-2 description HO completion is inaccurate?

[R2-2304943](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2304943.zip) Correction on handover procedure completion vivo, Nokia (rapporteur) CR Rel-8 36.300 8.12.0 1385 - F LTE-L23

- Lenovo thinks cover page should state Stage-2 is not aligned with Stage-3. Issue is not critical.

- Ericsson agrees that this is not critical but should be corrected. QC thinks we should correct this.

- Samsung prefers to correct the error. Thinks cover sheet is not fully correct. QC agrees.

- Huawei agrees there is no inter-operability issues. Thinks it’s not required to update this from Rel-8. Could just update in e.g. Rel-17. Lenovo thinks we could just correct this from Rel-17 since this is not critical to implementation.

* We will fix the issue in Rel-17. Should explain in cover page why this has no issues with earlier releases, correct any mistakes in current explanations, etc.
* Offline 202 to provide the CR in [R2-2306562](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2306562.zip)

Online (Tuesday) (1+1)

CR for release of QoE configuration/reporting at upper layers when UE moves to IDLE/INACTIVE (RAN2#121bis-e continuation):

[R2-2306273](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2306273.zip) Correction on QoE configuration release Google CR Rel-17 36.331 17.4.0 4935 - F LTE\_QMC\_Streaming-Core

* Revised in [R2-2306539](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2306539.zip)

[R2-2306539](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2306539.zip) Correction on QoE configuration release Google, Qualcomm, Ericsson CR Rel-17 36.331 17.4.0 4935 1 F LTE\_QMC\_Streaming-Core

- Samsung thinks this applies also to INACTIVE now since its on 1>-level. Should restrict it to IDLE only.

* Restrict the correction to RRC\_IDLE only.
* Offline 203 (Google) to revise the CR according to discussion. Final CR can be provided in [R2-2306563](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2306563.zip)

Additional discussion:

[R2-2305132](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2305132.zip) Discussion on QoE configuration release in LTE Lenovo discussion Rel-15 LTE\_QMC\_Streaming-Core Late

*Proposal 1: RAN2 to confirm that any active QoE measurement configuration in RRC\_CONNECTED is expected to be explicity released by the network prior to moving the UE to RRC\_INACTIVE or RRC\_IDLE via RRC connection release message.*

- Google is fine with P1 for normal case but not for error cases like RLF. Thinks we should align with NR. Ericsson thinks there are cases where network doesnt’ explicitly release this.

- Samsung agrees with intent but this doesn’t have specification impact. But should consider the other cases as well. Nokia acknowledges that something could be corrected but it’s hard to misunderstand.

- Huawei agrees with have a CR to fix the UE behaviour. Lenovo is fine to have the CR.

*Proposal 2: RAN2 to leave to UE implementation how to handle an active QoE measurement configuration and unsent QoE reports when the UE moves to RRC\_IDLE.*

* Noted.

# 7 Rel-18

## 7.5 XR Enhancements for NR

(NR\_XR\_enh-Core; leading WG: RAN2; REL-18; WID: [RP-230786](https://www.3gpp.org/ftp/TSG_RAN/TSG_RAN/TSGR_99/Docs/RP-230786.zip))

Time budget: 2 TU

Tdoc Limitation: 5 Tdocs

### 7.5.1 Organizational

Including LSs and any rapporteur inputs (e.g. work plan, SA2/SA4 progress reports)

Online (Tuesday) (1) - LSs

LSs from other groups:

[R2-2304659](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2304659.zip) LS out on the N6 PDU Set Identification (S4-230739; contact: Intel) SA4 LS in Rel-18 5G\_RTP, XRM, NR\_XR\_enh To:SA2, RAN2

*SA4 thanks SA2 for confirming the progress of the normative work timeline. As indicated in S4-230419, the new RTP header extension under SA4 5G\_RTP will signal the PDU set information, including PDU set sequence number, PDU set boundary indication, PDU sequence number within a PDU set, PDU set size, and PDU set importance.*

*During SA4#123-e, it was agreed to add a 3-bit End of Data Burst indication in the new header extension. SA4 has committed to progressing the semantics of the fields and developing normative guidelines for the Application Server on how to populate the fields of the RTP header extension for the supported media codecs. Upon completing such an effort, SA4 will continue to provide guidelines on how the UPF may extract some of the supported PDU set information from existing RTP/SRTP headers, header extensions, and payloads in case the newly defined RTP header extension is absent.*

*In addition to marking the last PDU of the data burst, SA4 sees the benefit of using additional bits to indicate inter-burst time, which may change dynamically due to various reasons, including application-layer rate control. SA4 believes that this can enable the RAN to switch to the most appropriate power state. SA4 kindly requests feedback from SA2 and RAN2 on the value and feasibility of such solution and if that can be supported within Rel. 18 timeframe.*

*SA4 is also defining the SDP signaling of the usage of the RTP header extension based on RFC8285. This allows the AF to receive certain PDU set information and pass it along to the PCF/NEF using the N5/N33 interface procedures. The header extension configuration should be shared with the UPF, and SA4 will provide the relevant configuration information to SA2/CT3 for this purpose.*

*To RAN2:*

*ACTION:*

1. *SA4 would like to kindly ask RAN2 to provide feedback on the feasibility and value of having additional signaling bits related to End of Burst and inter-burst time within Rel-18.*
* ?? (Need for a) reply LS discussed with contributions under 7.5.2

Online (Tuesday) (1) – Work plan

Work plan:

[R2-2305186](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2305186.zip) Work Plan for Rel-18 WI on XR Enhancements for NR Nokia, Qualcomm (Rapporteurs); Ericsson (RAN1 FL) Work Plan Rel-18 NR\_XR\_enh-Core

* ?? Endorsed

Online (Tuesday) (2) – SA2/SA4 status

SA2 and SA4 work status:

[R2-2305187](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2305187.zip) SA2 Status for XR Nokia, Qualcomm (Rapporteurs) discussion Rel-18 NR\_XR\_enh-Core

* ?? Noted

[R2-2305188](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2305188.zip) SA4 Status for XR Nokia, Qualcomm (Rapporteurs) discussion Rel-18 NR\_XR\_enh-Core

* ?? Noted

Online (Tuesday) (1) – Running CRs

Running CRs:

[R2-2305189](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2305189.zip) Stage 2 Overview of XR Enhancements Nokia, Qualcomm (Rapporteurs) draftCR Rel-18 38.300 17.4.0 B NR\_XR\_enh-Core

* Companies are encouraged to provide comments on the CR to rapporteur(s) already during the meeting (i.e. before any post-meeting email discussion)
* ?? For MAC, RRC, PDCP and RLC running CRs, the CR rapporteurs are requested to submit first running CRs as rapporteur input (which are not counted against the Tdoc limits).

TBD: Post-meeting email discussions (XR) (N) – Running CR(s)

* [Post122][211][XR] Stage-2 running CR for XR (Nokia)

 Scope: Update 38.300 running CR based on this meeting’s agreements.

 Intended outcome: Endorsed running CR

 Deadline: Short

IF time allows: Online (Thursday) (1)

What kind of UE capabilities are needed for XR?

[R2-2305492](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2305492.zip) UE Capabilities for Rel-18 XR WI Intel Corporation discussion Rel-18 NR\_XR\_enh-Core

*Observation 1. During Rel-18 XR SI phase, RAN2 informed SA2 and SA4 multiple times the assumption that PDU set concept is applicable to UL side and UE is able to identify the corresponding PDU set related information. By not responding to this, RAN2 understands that there is no concern/issue identified by SA2 and SA4 on this regard.*

*Observation 2. RAN2 agreed for UE to provide UL jitter information to RAN and it is FFS whether UE might also be defined other ones such as end of data burst or inter-burst time.*

*Proposal 1. To confirm that UE AS layer has visibility to the same PDU set concept/information for UL as it is currently defined by SA2 for DL traffic.*

*Proposal 2. A new optional radio capability (e.g., supportOfPDU-Set) is defined to identify UE supporting PDU set concept/information. FFS whether a new radio capability is required for UE’s knowledge of the Data Burst related concept/information,*

*Proposal 3. At least one new optional UE capability signaling is defined for the new UE assistance information related to XR traffic requires.*

*Proposal 3.1. If RAN2 agrees to provide multiple kind of UE assistance information (so far UL jitter is agreed, and it is FFS at least End of data burst and inter-burst time), to discuss whether a single capability is sufficient or multiple ones is preferable (i.e., one per each kind of information that UE can provide).*

*Proposal 4. A new optional UE capability signaling (e.g., supportOfDiscardPDU-Set) is defined to identify Rel-18 UEs supporting discard operation associated with the PDU Set concept. This supportOfDiscardPDU-Set is optional capability only if UE also supports supportOfPDU-Set.*

*Proposal 5. A new optional UE capability signaling (e.g., supportOfNewBS-Table) is defined to identify Rel-18 UEs supporting BSR enhancements associated with the new BS tables. FFS whether this capability may also include other BSR related enhancements (e.g., new BSR trigger conditions) and whether it has any pre-requirement (e.g., to the support of supportOfPDU-Set).*

*Proposal 6. To discuss whether a new optional UE capability signaling (e.g., supportOfDelayReporting) is defined to identify Rel-18 UEs supporting enhancements associated with the delay reporting of the buffered data or whether this is included as part of Proposal 4, i.e., new UE capability on BSR related enhancements.*

*Proposal 7. Wait for RAN1 input on new UE capabilities for RAN1 lead objectives, i.e., Multiple CG PUSCH transmission occasions in a period of a single CG PUSCH configuration and Dynamic indication of unused CG PUSCH occasion(s) based on UCI.*

*Proposal 8. A new optional UE capability signaling (e.g., supportOfRationalDRX) is defined to identify Rel-18 UEs supporting C-DRX enhancements targeting any traffic with non-integer periodicity.*

### 7.5.2 XR awareness

Including discussion on XR traffic assistance information from UE to networkIncluding discussion on how UL jitter information is reported from UE to network: what exactly is reported and via which signalling, what are the value ranges, how does network detect UL EoDB (e.g. can padding BSR be used for that?), etc.

Online (Tuesday) (1) – UL jitter information

Jitter signalling:

[R2-2304708](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2304708.zip) Discussion on XR awareness Qualcomm Incorporated discussion Rel-18 NR\_XR\_enh-Core

*UL jitter information*

*Proposal 1. UE reports to RAN the range of jitter in its UL traffic, defined in the same way as the one for N6 jitter.*

*Proposal 2. Range of UL jitter is reported per logical channel. Network can configure for which logical channel UE should report jitter information.*

*Proposal 3. Network can configure whether UE reports UL jitter information periodically or only when the range exceeds a threshold.*

*End of data burst indication*

*Observation 1. End of burst indication by UE can help network determine whether to terminate DRX active time early and thus save UE more power.*

*Observation 2. Padding BSR may not be a reliable way to indicate EoDB when there is jitter in UL traffic. It may cause premature termination of DRX active time and interruption in scheduling.*

*Observation 3. An explicit EoDB indication can help network schedule UE with more certainty.*

*Proposal 4. Introduce EoDB indication explicitly signaled by UE. FFS the type of signal used to send the indication.*

*Proposal 5. Specify a method for UE to terminate its DRX active time faster than the legacy ones after it sends a UL EoDB indication. FFS details of this method.*

*Other UL traffic information*

*Proposal 6. UE can report UL traffic periodicity of a logical channel to RAN. This information is a complement, not a replacement, to the traffic periodicity provided by CN to RAN.*

*Proposal 7. UE can report its preferred start offset for a CG to RAN.*

*Proposal 8. UL traffic information can be signaled via the RRC message UE Assistance Information.*

* Focus on P1-3, P6-8

[R2-2305634](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2305634.zip) Remaining Issues on UL Traffic assistance information for XR CMCC discussion Rel-18 NR\_XR\_enh-Core

*Proposal 1: the UL Jitter information can be defined associated with the Periodicity in uplink, which can be defined as BAT offset, i.e., variation of burst arrival time for UL traffic resulting from UL jitter which value can be positive or negative.*

*Proposal 2: the range of UL Jitter information is better to be set as [-4, +4].*

*Proposal 3: the UL Jitter information can be optional, in case of the UL pose/control traffic.*

*Proposal 4: it is proposed gNB can acquire the anticipated UL jitter information from UE via UEAssistanceInformation message as in LTE V2X.*

*Proposal 5: It is proposed to define an approach to enable the gNB be aware of EoDB timely, e.g. in regular BSR.*

* Focus on P1-2

[R2-2305827](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2305827.zip) Discussion on XR-awareness Ericsson discussion Rel-18 NR\_XR\_enh

*Observation 1 BSR will indicate when a UE has empty buffer (padding BSR), such can be considered as EoDB information*

*Proposal 1 RRC UAI framework is updated for Rel-18 to support signalling UL jitter and associated periodicity information.*

*Proposal 2 UE report statistical UL jitter range X and associated periodicity Y on a per QoS flow*

*Proposal 3 RAN2 discuss the value range of UL jitter X and associated periodicity Y*

**

*Figure 1 Illustration of two options representing jitter information*

*Proposal 4 If RRC UAI is enhanced with UL jitter and associated periodicity information, RAN2 should discuss the configuration of report triggers, e.g. prohibition timer or change threshold that regulate when UE is allowed to send UL jitter and periodicity information.*

*Proposal 5 Explicit EoDB signalling in UL is not needed.*

*Proposal 6 RAN2 responds to SA4, with SA2 cc, that RAN2 does not see the usefulness of the EoDB. Nonetheless, if SA4 wants to define it, one single bit would be sufficient.*

* Focus on P1-4

[R2-2305158](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2305158.zip) XR awareness InterDigital discussion Rel-18 NR\_XR\_enh-Core

*Observation 1: Enhancements to the TSCAI framework are needed to provide UL jitter statistics.*

*Observation 2: There are latency considerations associated with providing jitter information to the RAN from the CN.*

*Proposal 1: UE transmits UL jitter statistics to the RAN.*

*Proposal 2: Enhance UAI framework to enable UE reporting of UL jitter to the RAN.*

*Proposal 3: Reporting of UL jitter statistics from UE to RAN via UAI is configurable on a per flow or per radio bearer basis.*

*Proposal 4: RAN2 to discuss the applicability of the DL jitter ranges for UL traffic by also taking into account the tethering use case. Discussion with SA4 may be needed.*

*Proposal 5: UE reports EoDB to the RAN.*

*Proposal 6: EoDB may additionally convey the inter-burst time between consecutive data bursts, e.g., based on traffic periodicity.*

*Proposal 7: RAN2 to discuss if reporting of statistics on inter-burst time between consecutive data bursts (e.g., via UAI) is also required.*

[R2-2305740](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2305740.zip) Discussion on UL jitter information Samsung discussion Rel-18 NR\_XR\_enh-Core

*Proposal 1. UL jitter information and the associated UL periodicity for a QoS Flow can be reported from UE to network.*

*Proposal 2. UEAssistanceInformation message can be used for indicating the assistance information of UL jitter.*

Online (Tuesday) (2) – EoDB determination for UL

EoDB determination: Is padding BSR sufficient for UL EoDB or is something else needed?

[R2-2305190](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2305190.zip) Jitter and End of Data Burst Signalling Nokia, Nokia Shanghai Bell discussion Rel-18 NR\_XR\_enh-Core

*Proposal 1: Do not use PIN delay budget request for jitter reporting for XR services.*

*Proposal 2: Adopt both alternatives 1 and 2 for signalling and measuring uplink jitter.*

*Proposal 3: Adopt Padding BSR with BS value equal to zero as implicit End of Data Burst (EoDB) indicator for the RAN.*

[R2-2305897](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2305897.zip) RAN awareness of XR characteristics MediaTek Inc. discussion Rel-18 NR\_XR\_enh [R2-2303301](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2303301.zip)

*Observation 1: Assistance information on UL traffic is not needed for the gNB to configure DRX correctly.*

*Observation 2: Assistance information on UL traffic can be useful to the gNB to ensure CG is appropriately configured.*

*Proposal 1: On the UL, the identification of PDU sets, data bursts and PSI is left to UE implementation.*

*Proposal 2: XR traffic assistance consists of periodicity, latest arrival time, and min/max size of data expected per period.*

*Proposal 3: XR traffic assistance is signalled using the UE assistance framework.*

[R2-2305301](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2305301.zip) Discussion on periodicity, jitter, and end of burst indication KDDI Corporation discussion

*Observation 1: UL/DL periodicity in TSCAI is defined per QoS Flow not per PDU Set.*

*Observation2: Configured grant/Semi persistent scheduling can have multiple configurations.*

*Observation3: If gNB knows UL/DL periodicity per PDU set, then gNB can optimize Configured grant/Semi persistent scheduling based on each UL/DL periodicity of each PDU set.*

*Observation4: gNB can acquire DL periodicity and jitter per PDU set by counting PDU packets with PDU Set Information.*

*Observation5: For UL periodicity and jitter per PDU Set, gNB needs to be indicated from UEs.*

*Proposal1: RAN2 agree that UE can report UL jitter information per QoS Flow.*

*Proposal2: RAN2 discuss how UE reports UL jitter information per QoS Flow to gNB.*

*Proposal3: RAN2 agree to introduce UL/DL periodicity and jitter per PDU set.*

*Proposal4: RAN2 discuss how UE reports UL periodicity and jitter per PDU set to gNB.*

*Proposal5: RAN2 agree not to introduce UL end of burst indication from UE.*

[R2-2304865](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2304865.zip) Further discussions on XR awareness Futurewei discussion Rel-18 NR\_XR\_enh-Core

[R2-2304915](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2304915.zip) Discussion on XR awareness vivo discussion Rel-18 NR\_XR\_enh-Core

[R2-2304967](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2304967.zip) Enhancements for XR awareness CATT, Dell Technologies discussion Rel-18 NR\_XR\_enh-Core

[R2-2305005](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2305005.zip) Discussion on XR awareness Xiaomi Communications discussion

[R2-2305016](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2305016.zip) XR Awareness in RAN ZTE Corporation, Sanechips discussion

[R2-2305071](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2305071.zip) Views on XR-Awareness Apple discussion Rel-18 NR\_XR\_enh-Core

[R2-2305361](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2305361.zip) XR awareness NEC discussion Rel-18 NR\_XR\_enh-Core

[R2-2305493](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2305493.zip) XR Awareness in UE and RAN Intel Corporation discussion Rel-18 NR\_XR\_enh-Core

[R2-2305513](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2305513.zip) Considerations on XR PDU prioritization Sony discussion Rel-18 NR\_XR\_enh-Core

[R2-2305532](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2305532.zip) Discussion on XR awareness OPPO discussion Rel-18 NR\_XR\_enh-Core

[R2-2305536](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2305536.zip) On XR awareness Google Inc. discussion

[R2-2305565](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2305565.zip) Discussion on XR awareness Spreadtrum Communications discussion Rel-18

[R2-2305684](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2305684.zip) Discussion on PDU sets and data burst awareness in RAN Lenovo discussion Rel-18

[R2-2305808](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2305808.zip) Discussion on PDU set and data burst information Huawei, HiSilicon discussion Rel-18 NR\_XR\_enh-Core

[R2-2306205](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2306205.zip) Further discussion on XR awareness TCL Communication discussion Rel-18

[R2-2306333](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2306333.zip) Discussion on XR awareness LG Electronics Inc. discussion NR\_XR\_enh-Core

[R2-2306463](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2306463.zip) Discussion on XR-awareness NTT DOCOMO, INC. discussion

[R2-2306481](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2306481.zip) Discussion on XR awareness China Unicom discussion NR\_XR\_enh-Core

### 7.5.3 XR-specific power saving

Including discussion and details of solutions for DRX cycles with XR: do we use rational numbers for DRX cycle or do integer adjustments? How does each solution work in details?

Including discussion on solutions for SFN wrap-around, e.g. what is the reference SFN: H-SFN, E-SFN or some generic counter?

Online (Tuesday) (2) – DRX handling for non-integer periodicity

DRX mismatch:

[R2-2304709](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2304709.zip) Discussion on DRX mismatch problem for XR Qualcomm Incorporated, MediaTek, CATT, vivo, NEC, Meta discussion Rel-18 NR\_XR\_enh-Core

*Observation 1. Options that necessitate non-uniform DRX cycles or multiple on durations within a DRX cycle have non-trivial impacts on RAN1/4 specs but do not offer better performance (e.g. delay, power savings) than others.*

*Observation 2. For the option with uniform DRX cycle expressed as a rational number, there are methods to implement modulo operation on rational numbers without rounding errors.*

*Observation 3. The option with uniform DRX cycle expressed as a rational number consistently introduces less amount of mismatch between the start of traffic and DRX cycles across various frame rates than the option with periodic adjustment of drx-StartOffset.*

*Observation 4. The option with uniform DRX cycle expressed as a rational number has much less impact on the legacy DRX formula than the option with periodic adjustments of drx-StartOffset.*

*Observation 5. There is no forward compatibility issue with the option with uniform DRX cycle expressed as a rational number, if the ASN.1 signaling for new DRX cycles is properly designed.*

*Proposal 1. Deprioritize options that require non-uniform DRX cycles or multiple on durations within a DRX cycle.*

*Proposal 2. Adopt the option with uniform DRX cycle expressed as a rational number.*

[R2-2304808](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2304808.zip) Discussion on C-DRX enhancements for XR Huawei, HiSilicon discussion Rel-18 NR\_XR\_enh-Core

*Non-Integer periodicitry*

*Proposal1: To address the issue of non-integer periodicities, single DRX configuration with multiple start offsets should be supported.*

*SFN wrap-around*

*Proposal2: Introduce E-SFN, which increments at every SFN wrap around and has a pre-defined range such as 0~99, to address the SFN wrap around issue.*

*Proposal3: Reference SFN is used to help align the E-SFN between the gNB and the UE.*

[R2-2305652](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2305652.zip) DRX enhancements for XR Nokia, Nokia Shanghai Bell, Continental Automotive discussion Rel-18 NR\_XR\_enh-Core

*Observation: no difference from the start time point of view for all the (sub)options when the UE wakes up the on Duration. Which option to adopt is more of a modelling issue.*

*Proposal 1: DRX cycle is defined as hyper cycle / number of cycles per hyper cycle. Possible combinations of hyper cycle and number of cycles per hyper cycle are: (100, 3), (200, 9), (50, 3), (125, 9), (100, 9), (25, 3) for the frame rate of 30fps, 45fps, 60fps, 72fps, 90fps, 120fps.*

*Proposal 2: for DRX cycle alignment, introduce an integer hyper cycle and number of cycles per hyper cycle as RRC parameters and make the MAC formula change as follows:*

*1> if the Long DRX cycle is used for a DRX group, and floor ([(SFN × 10) + subframe number] modulo (drx-LongCycle)) = drx-StartOffset:*

*Proposal 3: discuss whether it is enough to only support Long Cycle or Short Cycle should also be supported.*

*Proposal 4: option 3 with drxReferenceSFN is used as the reference for SFN wrap around.*

*Proposal 5: The formula is changed as follows:*

*1> if the Long DRX cycle is used for a DRX group, and [(SFN × 10 + N × 10240 + drxReferenceSFN × 10) + subframe number] modulo (drx-LongCycle) = drx-StartOffset:*

*Proposal 6: When both hyper cycle and drxReferenceSFN are configured, the formula for Long DRX Cycle would be as follows:*

*1> if the Long DRX cycle is used for a DRX group, and floor ([(SFN × 10 + N × 10240 + drxReferenceSFN × 10) + subframe number] modulo ((drx-LongCycle))) = drx-StartOffset :*

*Proposal 7: the legacy formula should be left untouched and which new one is used depends on whether either hyper cycle or drxReferenceSFN or both are configured.*

Online (Tuesday) (2) – SFN wrap-around

SFN wrap-around:

[R2-2304710](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2304710.zip) Discussion on SFN wrap around problem for XR Qualcomm Incorporated, Huawei, HiSilicon, Meta discussion Rel-19 NR\_XR\_enh-Core

*Observation 1. If maximum value of the counter is not specified, there can be inter-operability issue between different spec implementations.*

*Proposal 1. The counter in DRX formula for addressing SFN wrap around is not obtained from system information.*

*Proposal 2. The maximum value of the counter is RRC configured by network during DRX re-/configuration.*

*Proposal 3. Network sets DRX reference SFN drx-ReferenceSFN to either 0 or 512, in the same way as in Rel-16 IIoT.*

*Proposal 4. RAN2 discuss and select one of the following options:*

*• Option A: both the counter NSFN and the DRX reference SFN drx-ReferenceSFN are added to DRX formula. The initial value of NSFN =0;*

*• Option B: only NSFN is added to DRX formula. However, the initial value of NSFN is set according to drx-ReferenceSFN as follows:*

*◦ If UE successfully receives RRC configuration in SFNUE, UE initializes the counter NSFN to 1 if 0 ≤ SFNUE < 512 and drx-ReferenceSFN = 512 (i.e. there may be ambiguity);*

*◦ Otherwise (i.e. there is no ambiguity), UE initializes NSFN to 0.*

[R2-2305898](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2305898.zip) Considerations for SFN wrap around solution MediaTek Inc., LGE discussion Rel-18 NR\_XR\_enh

*Observation 1: The option of broadcasting E-SFN in system information has small MAC specification impact and would not require a reference SFN but has a small overhead impact in system information (e.g., extra 10 bits in SIB1).*

*Observation 2: The option of maintaining the E-SFN independently on the UE and the network has slightly more MAC specification impact and would require a reference SFN but it has less signalling overhead.*

*Observation 3: Shared knowledge of the maximum value of E-SFN by the UE and the network can improve the reliability and inter-operability of different spec implementations.*

*Proposal 1: Adopt the following enhanced long and short DRX formula by introducing E-SFN:*

*• Long DRX: [(E-SFN × 10240) + (SFN × 10) + subframe number] modulo (drx-LongCycle) = drx-StartOffset*

*• Short DRX: [(E-SFN × 10240) + (SFN × 10) + subframe number] modulo (drx-ShortCycle) = (drx-StartOffset) modulo (drx-ShortCycle)*

*Proposal 2: RAN2 to discuss and select one of the following options:*

*• Option 1: E-SFN is broadcast by the network*

*• Option 2: E-SFN is maintained independently by the UE and the network*

*Proposal 3a: If option 1 in P2 is selected:*

*• Network broadcasts the E-SFN in system information (FFS which SIB, e.g., SIB1).*

*• FFS the size of the E-SFN field in system information (e.g., 10 bits).*

*Proposal 3b: If option 2 in P2 is selected:*

*• Network provides the reference SFN, SFN\_ref, in binary value (i.e., either 0 or 512), as in Rel-16 IIoT via dedicated RRC signalling (in RRC configuration for DRX).*

*• If the UE successfully receives RRC configuration for DRX at SFN\_UE:*

*o If SFN\_ref=0 (or not present):*

* UE initializes the counter E-SFN to 0.*

*o If SFN\_ref=512:*

* If 0 ≤ SFN\_UE < 512, UE initializes the counter E-SFN to 1*

* Otherwise, UE initializes the counter E-SFN to 0.*

*• UE increments the counter E-SFN by 1 when SFN wraps around 1023 to 0.*

*Proposal 4: RAN2 to discuss and select one of the following options:*

*• Option A: The maximum value of the E-SFN counter is decided by the network and indicated to the UE via RRC signalling (e.g., in DRX configuration)*

*• Option B: The maximum value of the E-SFN counter is fixed in the specifications (FFS what the value is, e.g., 999)*

*• Option C: There is no maximum value specified for the E-SFN counter (the counter runs to infinity)*

* Focus on P2, P3a, P3b

[R2-2304916](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2304916.zip) Analysis on introducing H-SFN for DRX formulas vivo discussion Rel-18 NR\_XR\_enh-Core

*Observation 1: Mismatch happens when SFN wrap-around if the DRX cycle is set to a value when 10240ms is not integer times of DRX cycle.*

*Observation 2: The approach of introducing H-SFN in the C-DRX formulas does not require a reference SFN and no new parameters need to be introduced in the RRC specification.*

*Observation 3: H-SFN takes nearly 3 hours to wrap around, so not much signaling overhead will be introduced for DRX reconfiguration.*

*Observation 4: The approach of introducing E-SFN in the C-DRX formulas brings more MAC specification and RRC specification impact than the approach of introducing H-SFN in the C-DRX formulas.*

*Proposal 1: To handle the SFN wrap-around issue, introduce hyper frame number already existing in SIB1 in the C-DRX formulas. The C-DRX formulas can be enhanced as below:*

*‐ [(SFN + 1024\* H-SFN) × 10+ subframe number] modulo (drx-LongCycle) = drx-StartOffset*

*‐ [(SFN + 1024\* H-SFN) × 10+ subframe number] modulo (drx-ShortCycle) = (drx-StartOffset) modulo (drx-ShortCycle)*

[R2-2304954](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2304954.zip) Discussions on DRX enhancements for XR Fujitsu discussion Rel-18 NR\_XR\_enh-Core

[R2-2304968](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2304968.zip) Enhancements for SFN wrap-around CATT discussion Rel-18 NR\_XR\_enh-Core

[R2-2305006](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2305006.zip) Discussing on XR-specific C-DRX enhancement Xiaomi Communications discussion

[R2-2305007](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2305007.zip) Discussion on power saving scheme for XR Samsung discussion Rel-18 NR\_XR\_enh

[R2-2305017](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2305017.zip) XR-specific power saving ZTE Corporation, Sanechips discussion

[R2-2305072](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2305072.zip) C-DRX enhancements for XR Apple discussion Rel-18 NR\_XR\_enh-Core

[R2-2305159](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2305159.zip) XR-specific power saving InterDigital discussion Rel-18 NR\_XR\_enh-Core

[R2-2305367](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2305367.zip) Discussion on DRX enhancements for XR FGI discussion

[R2-2305456](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2305456.zip) Discussion on C-DRX enhancement for XR NEC Corporation discussion Rel-18 NR\_XR\_enh-Core

[R2-2305458](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2305458.zip) Discussion on DRX cycle alignment for XR ITRI discussion NR\_XR\_enh-Core

[R2-2305494](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2305494.zip) C-DRX Enhancements for XR Traffic Intel Corporation discussion Rel-18 NR\_XR\_enh-Core

[R2-2305543](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2305543.zip) XR-specific power saving enhancement Google Inc. discussion

[R2-2305593](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2305593.zip) Discussion on power saving aspects for XR Continental Automotive discussion Rel-18

[R2-2305626](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2305626.zip) Discussion on the DRX enhancement CMCC discussion Rel-18 NR\_XR\_enh-Core

[R2-2305685](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2305685.zip) Discussion of DRX enhancement Lenovo discussion Rel-18

[R2-2305830](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2305830.zip) Discussion on XR-specific power saving Ericsson discussion Rel-18 NR\_XR\_enh

[R2-2306143](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2306143.zip) DRX enhancement for power saving in XR LG Electronics Inc. discussion Rel-18 NR\_XR\_enh-Core

[R2-2306203](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2306203.zip) Discussion on various frame rates supported for XR-specific power III discussion

### 7.5.4 XR-specific capacity improvements

No documents should be submitted to 7.5.4. Please submit to 7.5.4.x

#### 7.5.4.1 BSR enhancements for XR

Including discussion on delay status reporting: What does UE report for the remaining time and how is the reporting triggered? How does UE calculate the remaining time and what is the granularity of the reporting?

Including discussion on how to decide whether to use static or configured BSR tables for XR, explaining the details of the solutions, e.g. selection of BSR table, amount of needed new tables and how they are created (e.g. based on which distributions/parameters), analysis of quantization errors with the proposed solution, BSR MAC CE structure (e.g. extend/reuse current MAC CE format), etc.

Online (Tuesday) (1) – Delay reporting

Delay reporting:

[R2-2304955](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2304955.zip) Discussions on delay information reporting Fujitsu discussion Rel-18 NR\_XR\_enh-Core

*Proposal 1: Remaining time is the PSDB of a PDU set minus the buffered time of the PDU set in PDCP and RLC.*

*Proposal 2: The data volume corresponding to the remaining time is the total amount of PDCP data and RLC data corresponding to the remaining time.*

*Proposal 3: When the remaining time of a PDU set is lower than a threshold, a delay information report or a BSR (if extension of BSR is agreed for delay information report) is triggered.*

*Proposal 4: The index indicating a range of the remaining time can be included in the delay information report.*

*Proposal 5: A table for including the index of the remaining time and the corresponding range of the remaining time is defined in MAC specification.*

*Proposal 6: The remaining time indicates the PSDB of a PDU set minus the buffered time of the PDU set in PDCP and RLC calculated at the initial transmission of the delay information report/BSR MAC CE.*

Online (Tuesday) (2) – Static vs. configured BSR tables

BSR tables:

[R2-2305149](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2305149.zip) New BS table(s) and BSR trigger(s) NEC discussion Rel-18 FS\_NR\_XR\_enh

*BSR table generation*

*Proposal 1 New BS table is generated based on gNB’s configuration*

*For BS configuration:*

*Proposal 2 In addition to legacy BS table(s), Network configure at most one additional BS table a LCG is eligible to use. Different BS table can be configured for different LCG*

*Proposal 3 Network configure Bmin and step size X for each new BS table. (Bmax is equal to Bmin+ X\*number of codepoints)*

*For BSR MAC CE:*

*Proposal 4 Per LCG BS report is taken as baseline. Higher granularity than per LCG BS report can be discussed together with remaining delay report.*

*Observation 1: it should be possible not to apply new BS table for SRB(s) and DRB not for XR traffic*

*Observation 2: UE should be able to fall back to legacy BS table(s) for a LCG which is configured/enabled with new BS table (e.g., in case the buffer size becomes small after being scheduled)*

*Proposal 5 BS table indication per LCG is introduced in BSR MAC CE, to enable UE to switch BS table depending on the buffer size*

*Proposal 6 For a long or long truncated BSR MAC CE, BS field has fixed length of 8 bits.*

*Proposal 7 if new BS table is configured/enabled for a LCG, for a short or short truncated BSR MAC CE, BS field has fixed length of 8 bits too, either legacy or new 8bit BS table could be used.*

*Regarding new BSR trigger(s):*

*Proposal 8 Introduce new BSR trigger based on unknown/unexpected buffer size change(not due to being scheduled, but due to discard or additional data arrival)*

*Proposal 9 Introduce new BSR trigger based on UL grant size is bigger than a threshold*

* Focus on P1-3

[R2-2304711](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2304711.zip) BSR and delay status report for XR Qualcomm Incorporated discussion Rel-18 NR\_XR\_enh-Core

*New BSR table*

*Observation 1. It is possible to define a single new BSR table that achieves an average quantization error of ~1% as follows:*

*• It covers all common bit rates and frame rates;*

*• Use linear distribution and 8-bit BS field length;*

*• Choose maximum BS based on maximum bit rate and minimum frame rate;*

*• Choose minimum BS such that no BS in the new table has a quantization error worse than the legacy one.*

*Observation 2. The new BSR table generated by the method in Observation 1 is forward compatible because the entire table scales linearly with maximum bit rate.*

*Observation 3. If new BSR table(s) is RRC configured, then parameters and formula used to generate a new BSR table should be defined in a way that different UE/NW implementations can produce the same table.*

*Proposal 1. Introduce a single pre-defined BSR table, e.g. derived based on the method described in Observation 1.*

*Proposal 2. If new BSR table(s) is RRC configured,*

*• Network configures UE with minimum buffer size Bmin, distribution type (linear or exponential), and step size factor p.*

*• Buffer size Bk can be generated according to the following formula: B1 = Bmin, and Bk = Bk-1 + floor(BS x p), for k=2, …, N, where BS = Bmin linear distribution and BS = Bk-1 for exponential distribution.*

*Proposal 3. The length of BS field is 8 bits, regardless of whether new BSR table(s) is pre-defined or RRC configured.*

*Proposal 4. If there are multiple BSR tables (including the legacy one) for UE to use, then UE should always choose the one which has the least quantization error for the buffer size to be reported.*

*Proposal 5. The new BSR MAC CE should include an indication by UE that which BSR table it used for reporting.*

* Focus on P1-5

*Delay status reporting*

*Observation 4. It is not necessary for UE to report delay status of every QoS flow, e.g. those without stringent delay requirements.*

*Proposal 6. Network can configure which LCG(s) should report its delay status.*

*Proposal 7. UE triggers a DSR when an LCG configured for reporting and its associated L2 buffer has data whose remaining time drops below a configured triggering threshold.*

*Proposal 8. The remaining time of a PDU is defined as the residual value of its associated PDCP discard timer.*

*Proposal 9. Network can also configure an LCG to periodically report its delay status.*

*Proposal 10. Network can configure one or more reporting thresholds for an LCG. For each reporting threshold, UE reports the amount of data whose remaining time is below that threshold.*

*Proposal 11. The remaining time reported in a DSR is the duration between the time when the DSR is transmitted and the delay deadline of the corresponding PDU.*

[R2-2306130](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2306130.zip) Discussion on MAC enhancements for XR-specific capacity improvement Huawei, HiSilicon discussion Rel-18 NR\_XR\_enh-Core

*For the design of BSR MAC CE:*

*Observation 1: Reporting only a single value of remaining time per LCG when there are multiple data bursts with different remaining times in a LCG is not sufficient for the gNB to perform efficient traffic scheduling.*

*Proposal 1: Define a new BSR MAC CE format indicating the data volume together with its associated remaining time.*

*Proposal 2: UE should be able to report multiple BS values and their associated remaining times in a single BSR MAC CE when there is data with different remaining times within the same LCG.*

*Proposal 3: UE should have at most one new BSR table applicable per LCG. The UE determines whether to use the new table or the legacy table for each LCG based on the buffer size and the new table’s range, i.e. new BSR table is used in case BS value falls within its range, otherwise UE uses legacy BSR table.*

*Proposal 4: The length of index in the new BSR tables should be the same as Long BSR format, i.e. 8 bits.*

*Proposal 5: The current value of the PDCP discard timer of a data burst is used as the remaining PSDB (i.e. “remaining time”) of the data burst.*

*Proposal 6: The remaining time is signalled with an index which corresponds to a certain remaining time threshold pre-configured by the network*

*For the design of new BS tables:*

*Observation 2: Ideally, the target BSR quantization error shall be less than 100 bytes, to minimize the resource wastage.*

*Observation 3: New BS tables are limited to 256 rows which limits the range of the new BSR table if the target quantization error is to be achieved.*

*Observation 4: The quantization error may still exist since the new BS table cannot match with all XR services well.*

*Observation 5: Even if the traffic pattern is known, the buffer can contain traffic from multiple LCHs and from different data bursts, making it impossible to come up with the proper BSR table*

*Proposal 7: New BSR tables should be designed with at least: linear distribution of code points and step size of 100 bytes.*

*Proposal 8: In order to alleviate the quantization error, RAN2 can consider the following approach:*

*1. Pre-define multiple buffer size tables in combination with network indicating which buffer size table the UE can use.*

*2. If the buffer size is not within a new table’s range, the UE uses an index referring to the legacy BSR table.*

*3. For the large buffer size/large quantization error, the UE uses an additional index to indicate a more precise range of buffer size (within the “roughly” range indicated in step 2).*

*For the trigger of BSR:*

*Proposal 9: The following BSR triggering enhancements should be introduced:*

*- trigger BSR when a new data burst arrives (alternatively: enhance the Periodic BSR by allowing the periodicBSR-Timer not to be restarted by other transmitted BSRs);*

*- trigger BSR when the data volume of discarded packets exceeds a threshold.*

*Proposal 10: UE should trigger the BSR with the remaining time when the remaining time is smaller than a pre-configured threshold.*

*For LCP restriction:*

*Observation 6: In case the UE is not able to prioritize urgent data during UL transmission, the usefulness and purpose of the remaining time reporting in the BSR is unclear.*

*Proposal 11: Introduce a new LCP restriction related to the remaining time of the data buffered in a certain LCH.*

[R2-2305828](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2305828.zip) Discussion on BSR enhancements for XR Ericsson discussion Rel-18 NR\_XR\_enh

*Proposal 1 Introduce RRC-based BS tables i.e. the NW provides a configuration for the UE to build additional BS tables*

*Proposal 2 NW may configure 1 table for the newly defined Short BSR.*

*Proposal 3 It is preferable that the NW can configure more than one table per LCG for the newly defined long BSR. Value to be selected depending on the BSR format (see Section 2.3)*

*Proposal 4 BS tables are defined by: an index, min value, max value, and stepSize.*

*Proposal 5 If stepSize is not provided, the UE calculates the step size as the (max value – min value) / (nr of indexes in the BS table)*

*Proposal 6 Tables are built as exemplified in Figure 2: For BS index 0, BS value is defined by: [ ≥ min value & ≤ min value x (stepSize x (BS index + 1) For next BS indexes, BS value is defined by [≤ min value x (stepSize x (BS index + 1)] Until reaching the max value.*

*Proposal 7 The NW may associate a LCG with up to “aa” (aa depends on Proposal 2) tables for a new long BSR*

*Proposal 8 Adopt the ASN.1 outlined above for the RRC-based BS table configuration.*

*Proposal 9 Only linear distribution is allowed for BS table creation.*

*Proposal 10 One new 5-bit BS table can be configured per LCG (as in Proposal 2).*

*Proposal 11 The new BSR has the same format as the legacy short BSR.*

*Proposal 12 The LCID index in the MAC subheader to identify this new short BSR should be taken from the eLCID field*

*Proposal 13 RAN2 to discuss if more tables can be configured.*

*Proposal 14 BS format can indicate up to 3 additional 8-bit BS tables (in addition to legacy table)*

*Proposal 15 Select option 4 for the table/BS format.*

*Proposal 16 The eLCID (1 octet) is used to for this new long BSR MAC CE.*

*Proposal 17 When multiple tables contain an index which can represent the UE buffer size, the UE shall use the BS table/index that minimizes the index error (smallest different between the minimum and maximum value represented by the index) and represents the UE buffer size.*

*Proposal 18 When only one table (including legacy BS tables) contains an index which represents the UE buffer size, the UE shall use the corresponding BS table and format.*

*Proposal 19 Current BSR triggering conditions are the baseline conditions for the new BSR introduced in Section 2.1.*

*Proposal 20 Delay reporting should also provide buffer information utilizing new defined BS tables.*

*Proposal 21 Delay reporting is done by indicating bucket indexes similar as for the buffer status, per LCG.*

*Proposal 22 Two delay tables per LCG can be configured: one for short delay reporting, another table for long delay reporting.*

*Proposal 23 A delay table is defined by: - min value, - max value, and - stepSize.*

*Proposal 24 Up to 8 buckets can be configured for long delay reporting. 1 bucket is enough for short delay reporting (see 2.2.3)*

*Proposal 25 For long delay reporting, if stepSize is not provided, the UE calculates the step size as the (max value – min value) / (nr of buckets e.g., 8)*

*Proposal 26 Delay table is built as: For index 0, BS value is defined by: [ ≥ min value & ≤ min value x (stepSize x (BS index + 1) Second and third index, BS value is defined by [≤ min value x (stepSize x (BS index + 1)] Last bucket index is defined by ≥ min value x (stepSize x (BS index + 1)] or ≥ max value (if provided)*

*Proposal 27 For short delay reporting, min and max value, or min and step size needs to be provided.*

*Proposal 28 Adopt the ASN.1 outlined above to configure the delay table.*

*Proposal 29 Delay reporting is triggered when new data enters an empty delay bucket. The buckets which trigger the delay reporting are configured by the network*

*Proposal 30 Delay reporting represents the waiting time for the PDU set since the first packet of the PDU set arrived to the UE buffer.*

*Proposal 31 The UE reports the buffer status in each of the delay/latency buckets.*

*Proposal 32 A short delay reporting is introduced. Its format is the same as the legacy BSR*

*Proposal 33 A short delay reporting indicates the highest priority LCG configured with delay reporting which has data in a bucket configured by the network.*

*Proposal 34 One bit is used to indicate the presence of data in a bucket.*

*Proposal 35 Adopt option 1:*

*a. 1 byte is introduced to indicate 8 buckets.*

*b. BS is reported using Option 4 as in Proposal 15*

*Proposal 36 The eLCID (1 octet) is used to for this new long delay reporting MAC CE.*

[R2-2306176](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2306176.zip) BSR enhancements for XR MediaTek Inc. discussion Rel-18

*Observation 1: In XR Traffic model, two factors 1) data rate (R) and 2) frames per second (FPS) determines the XR traffic characteristic, including mean, maximum and minimum packet sizes.*

*Observation 2: XR bitrate adaptation mechanism leads to different mean, maximum and minimum packet sizes.*

*Observation 3: The RRC configured BSR table can avoid quantisation errors of any form and can achieve better target level of quantization error than static BSR tables.*

*Proposal 1: RAN2 to adopt RRC configured BSR tables mechanism for new BSR table(s)*

*Proposal 2: gNB to control which BSR table is used by UE via presence of RRC BSR IE(s).*

*Proposal 3: BSR MAC CE format can be the same as legacy BSR MAC CE.*

*Proposal 4: BSR entry is generated using the formula Bmin + (k - 1) \* step-size, where Bmin and step size and configured by the NW.*

* If Bmin and step size are not configured, use legacy BSR table.*

* If configured, use new linear BSR table.*

*Proposal 5: UE chooses minimum delay value of buffered data as reported information.*

*Proposal 6: UE reports delay information with BSR.*

*Proposal 7: The reported delay information could be a range.*

*Proposal 8: RAN2 to study new trigger condition for BSR for XR services.*

Online (Tuesday) (1) – Support of piecewise linear BSR table

Support of piecewise linear BSR tables:

[R2-2305604](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2305604.zip) Consideration on Piecewise Linear BS Table CMCC, Huawei, HiSilicon, China Unicom discussion Rel-18 NR\_XR\_enh-Core

*Observation 1: Although there are some traffics of pose information, video traffics still occupy a large proportion in the UL XR traffics, which issues desire to be addressed as well.*

*Observation 2: Piecewise linear distribution has the least quantization error compared to exponential and linear distribution.*

*Based on the above observation, we propose that:*

*Proposal: RAN2 to agree that piecewise linear distribution can be used for new BS table(s) for XR traffic.*

TBD - Post-meeting email discussions (XR) (1) – BSR tables

* [Post122][21X][XR] MAC details of BSR tables (NN)

 Scope: Discuss the Stage-3 aspects of BSR tables for XR based on this meeting agreements.

 Intended outcome: Discussion document and MAC TP

 Deadline: Long

[R2-2304826](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2304826.zip) Discussion on BSR and DSR for XR TCL Communication Ltd. discussion Rel-18

[R2-2306242](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2306242.zip) Discussion on delay information for XR Google Inc. discussion Rel-18 NR\_XR\_enh-Core

[R2-2305364](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2305364.zip) Generate new buffer status report table FGI discussion

[R2-2306346](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2306346.zip) Discussion on new BSR table and delay information report LG Electronics Inc. discussion Rel-18 NR\_XR\_enh-Core

[R2-2306393](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2306393.zip) XR BSR and Delay Information Enhancements Meta USA discussion Rel-18 NR\_XR\_enh-Core

[R2-2304861](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2304861.zip) BSR Enhancements For XR Dell Technologies discussion Rel-18

[R2-2304864](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2304864.zip) Further discussions on BSR enhancements for XR Futurewei discussion Rel-18 NR\_XR\_enh-Core

[R2-2304917](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2304917.zip) Discussion on BSR enhancements for XR vivo discussion Rel-18 NR\_XR\_enh-Core

[R2-2304969](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2304969.zip) On BSR Enhancements CATT discussion Rel-18 NR\_XR\_enh-Core

[R2-2305002](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2305002.zip) Discussing on BSR enhancements for XR capacity Xiaomi Communications discussion

[R2-2305018](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2305018.zip) BSR enhancements for XR ZTE Corporation, Sanechips discussion

[R2-2305073](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2305073.zip) Views on BSR Enhancements for XR Apple discussion Rel-18 NR\_XR\_enh-Core

[R2-2305388](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2305388.zip) Discussion on BSR enhancements for XR Honor discussion

[R2-2305454](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2305454.zip) Discussion on BSR enhancement for delay information report NEC Corporation discussion Rel-18 NR\_XR\_enh-Core

[R2-2305495](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2305495.zip) BSR Enhancements for XR Traffic Intel Corporation discussion Rel-18 NR\_XR\_enh-Core

[R2-2305514](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2305514.zip) Considerations on XR UL PDU set information Sony discussion Rel-18 NR\_XR\_enh-Core

[R2-2305515](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2305515.zip) Some considerations on BSR enhancements for XR Sony discussion Rel-18 NR\_XR\_enh-Core

[R2-2305533](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2305533.zip) Discussion on BSR enhancement for XR OPPO discussion Rel-18 NR\_XR\_enh-Core

[R2-2305571](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2305571.zip) Consideration on BSR enhancements for XR Spreadtrum Communications discussion Rel-18

[R2-2305653](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2305653.zip) BSR enhancements for XR Nokia, Nokia Shanghai Bell discussion Rel-18 NR\_XR\_enh-Core

[R2-2305723](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2305723.zip) Discussion on BSR enhancements for XR Lenovo discussion Rel-18 NR\_XR\_enh-Core

[R2-2305816](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2305816.zip) BSR enhancements for XR Interdigital Inc. discussion Rel-18 NR\_XR\_enh-Core

[R2-2306243](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2306243.zip) Discussion on BSR enhancements for XR Google Inc. discussion Rel-18 NR\_XR\_enh-Core

[R2-2306252](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2306252.zip) Discussion on residual resource allocation for XR Google Inc. discussion Rel-18 NR\_XR\_enh-Core

[R2-2306275](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2306275.zip) Discussion on BSR enhancements for XR III discussion NR\_XR\_enh-Core

[R2-2306353](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2306353.zip) Discussion on BSR enhancements for XR Samsung discussion Rel-18 FS\_NR\_XR\_enh

#### 7.5.4.2 Discard operation for XR

Including discussion how the achieve PDU-set based discard in PDCP layer works for UL and DL and how is that specified (e.g. is there need for any PDCP CEs).

Including discussion on whether PDU set discard at PDCP impacts RLC layer (e.g. does discarding at PDCP also trigger discarding at buffered RLC PDUs).

Online (Tuesday) (1) – Is PSIHI configured for UL?

[R2-2305019](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2305019.zip) PDU discard for XR ZTE Corporation, Sanechips discussion

*Observation 1: When PSIHI indication is configured, if one of the PDUs within the PDU Set is lost/discarded, then, the entire PDU Set is discarded.*

*Proposal 1: PDCP entity can notify RLC layer to discard PDUs within a PDU set.*

*Proposal 2: PSIHI indication for UL is configured using RRC (in the PDCP-Config) to handle the PDU Set based discard functionality.*

*Proposal 3: The PDCP layer can take into account the PDU Set related information to enable PDU Set based discard functionality and no new fields are added in SDAP or PDCP header to enable this.*

*Proposal 4: When the PDCP entity discards the PDUs belonging to a PDU Set, this should be indicated to the receiving PDCP entity.*

*Proposal 5: The PDCP Control PDU format for PDCP status report is used as the baseline for indicating discarded PDUs.*

*Proposal 6: RAN2 discuss whether PDCP Control PDU format for PDCP status report should be optimized to indicate the discarded PDUs in one PDU set.*

*Proposal 7: When PSIHI indication is configured, if the PDCP transmitter entity discards the PDU Set, any PDUs belonging to the discarded PDU Set that are already received at the receiver should also be discarded at the receiving PDCP entity.*

* Focus on P2

Online (Tuesday) (1) – PDU set discard operation impacts to PDCP and RLC

Discard operation details:

[R2-2305191](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2305191.zip) Discard operation for XR Nokia, Nokia Shanghai Bell discussion Rel-18 NR\_XR\_enh-Core

*Proposal 1: when PSIHI is configured for a DRB, upon timer-based discarding of a PDCP SDU, all other SDUs belonging to the same PDU set are discarded (if still stored) and indicated to lower layers to be discarded (regardless of if still stored at PDCP).*

*Proposal 2: an additional early-discard timer is introduced at PDCP whose expiry time can depend on PSI (as opposed to the current discard timer that should depend on P(S)DB).*

*Proposal 3: upon expiry of the early-discard timer for a PDCP SDU, the SDU is discarded only if there are more important SDUs (in terms of PSI) associated with higher Count value stored for transmission.*

*Proposal 4: in both PDCP and RLC AM, introduce an indication from the transmitting entity to the receiving entity that reception of PDU(s) with given SN(s) is not to be expected.*

*Proposal 5: when indicated from upper layer (i.e. PDCP) to discard a particular RLC SDU, the transmitting UM RLC entity shall discard the indicated RLC SDU even if a segment thereof has been submitted to the lower layers.*

[R2-2304918](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2304918.zip) Discussion on discard operation for XR vivo discussion Rel-18 NR\_XR\_enh-Core

*Proposal 1: It is up to gNB to configure the value of discardTimer for each PDCP SDU of PDU set based on PSDB. FFS values of discardTimer.*

*Proposal 2: If PSIHI is indicated, when one SDU associated with a PDU set has not been successfully transmitted, the rest of this PDU set should be discarded.*

*Proposal 3: Whether need to keep the integrity of the PDU set (i.e. PSIHI) is per QoS flow indicated from CN to RAN via the control plane, e.g. from AMF by NAS signaling.*

*Proposal 4: In case congestion occurs, PDU set with lower importance (PSI) could be discarded. FFS how to determine the congestion.*

*Proposal 5: For UL, PDU set importance (i.e. PSI) is indicated from upper layer at UE side (e.g. by UE implementation)*

*Proposal 6: PDCP needs to inform RLC in case PDU set is discarded due to PSIHI.*

*Proposal 7: PDCP needs to inform RLC in case PDU set is discarded based on PSI in case of congestion.*

*Proposal 8: Upon discard is indicated from PDCP, RLC discards the indicated RLC SDU regardless of whether the RLC SDU nor a segment has been submitted to the lower layers.*

*Proposal 10: If in-sequence delivery is configured, the transmitter should inform the receiver of the DL PDU set discard information.*

*Proposal 11: If UE is configured to report PDU set discard information, the UE will inform gNB UL PDU set discard information.*

*Proposal 12: Transmitter informs the receiver of discard information when there is PDU set discard.*

Online (Tuesday) (1) – How does PSI impact UE operation for discard?

[R2-2305784](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2305784.zip) Discard Operation for XR Samsung R&D Institute India discussion Rel-18

*Observation 1: It is in the gNB remit to use PSIHI information when configuring PDCP discard per PDU Set basis.*

*Observation 2: The approach of using different discard timer values for PSIs may not be effective when congestion status changes dynamically, as there will be time delays from the congestion indication to actual packet discarding. While PSI threshold based approach can tackle congestion situation with early discard of less important PDU Sets, regardless of expiry of discard timer.*

*Observation 3: Discard operation at RLC layer is not always achievable. Discard enhancements on RLC may introduce RLC SN gap, and there may be undesired complexity for Tx and Rx RLC entities. It seems reasonable to avoid such large specification impact and efforts involved.*

*Observation 4: It is possible that receiver side PDCP may receive incomplete PDU Set, when PDU Set based PDCP discard is carried out at the transmitter side PDCP.*

*Observation 5: Different application media layer mappings and receiver implementations can be addressed by the PDU Set concept and the media/application layer should be able to configure the appropriate handling.*

*Observation 6: With the PDU Set identification information signalling, PDCP operation can be facilitated e.g. receiver side PDCP can easily identify whether the PDU Set is completely received, or is incompletely received. Existing PDCP SN can be reused and be further complimented with additional embedded signalling information to indicate start PDU, in-between PDU and end PDU of the PDU Set as part of the PDCP header.*

*Proposal 1: gNB configures the UE with PSIHI based configuration per XR DRB for performing PDCP discard per PDU Set basis in the uplink.*

*Proposal 2: gNB configures the UE per XR DRB, either to use the expiry of the PDCP discard timer to discard respective PDCP SDU (legacy behavior) or to use the expiry of the PDCP discard timer pertaining to the first SDU of the PDU Set to discard the PDCP PDU Set (new behavior).*

*Proposal 3: RAN2 is kindly asked to agree:*

*• Upon a NW congestion, PSI based PDCP discarding can be activated.*

*• NW congestion can be detected by the gNB. When the gNB indicates the congestion to the UE, the UE starts PSI based PDCP discarding.*

*Proposal 4: RAN2 is asked to discuss and select PSI based approach among:*

*• Option 1: Timer based discarding with different timer value for different PSI*

*• Option 2: PSI threshold based discarding (regardless of expiry of discard timer)*

*Proposal 5: Discard enhancements for PDU set should be limited to the PDCP layer and no enhancements are pursued for RLC layer.*

*Proposal 6: RAN2 to discuss potential enhancement on receiver side PDCP to handle and deliver received PDUs to application layer considering following:*

*a) If all PDUs are needed for the usage of PDU Set by application layer, the PDCP does not deliver the received PDUs of the incompletely received PDU Set to the application.*

*b) If all PDUs are not needed for the usage of PDU Set by application layer, PDCP delivers the received PDUs of the incompletely received PDU Set to the application.*

*c) It is configurable to the receiver PDCP entity whether a) or b) is required.*

*Proposal 7: RAN2 is to discuss the PDU Set identification information signalling to facilitate the receiver PDCP operation.*

* Focus on P3-4

[R2-2304712](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2304712.zip) Discussion on discard operation Qualcomm Incorporated discussion Rel-18 NR\_XR\_enh-Core

[R2-2304827](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2304827.zip) Discussion on discard indication for XR TCL Communication Ltd. discussion Rel-18

[R2-2304956](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2304956.zip) Discussions on PDU discard based on PDU Set Importance Fujitsu discussion Rel-18 NR\_XR\_enh-Core

[R2-2304970](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2304970.zip) Discard Operation for XR CATT discussion Rel-18 NR\_XR\_enh-Core

[R2-2305001](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2305001.zip) Discussing on PDU discarding of XR traffic Xiaomi Communications discussion

[R2-2305012](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2305012.zip) PDU discard CANON Research Centre France discussion Rel-18 NR\_XR\_enh-Core

[R2-2305074](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2305074.zip) Views on PDU Discard Operation for XR Apple discussion Rel-18 NR\_XR\_enh-Core

[R2-2305150](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2305150.zip) PDU discard NEC discussion Rel-18 FS\_NR\_XR\_enh

[R2-2305160](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2305160.zip) Discard operation for XR InterDigital discussion Rel-18 NR\_XR\_enh-Core

[R2-2305457](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2305457.zip) Discussion on the issues of PDU-Set discard ITRI discussion NR\_XR\_enh-Core

[R2-2305496](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2305496.zip) Discard Enhancements for XR Traffic Intel Corporation discussion Rel-18 NR\_XR\_enh-Core

[R2-2305534](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2305534.zip) Discussion on discard operation for XR OPPO discussion Rel-18 NR\_XR\_enh-Core

[R2-2305566](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2305566.zip) Discussion on XR discard Spreadtrum Communications discussion Rel-18

[R2-2305635](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2305635.zip) PDU-Set Discard operation for XR CMCC discussion Rel-18 NR\_XR\_enh-Core

[R2-2305724](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2305724.zip) Discard operation for XR communications Lenovo discussion Rel-18 NR\_XR\_enh-Core

[R2-2305829](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2305829.zip) Discussion on PDU Discard Ericsson discussion Rel-18 NR\_XR\_enh

[R2-2305899](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2305899.zip) Further aspects of PDU discard MediaTek Inc. discussion Rel-18 NR\_XR\_enh [R2-2303303](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2303303.zip)

[R2-2306106](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2306106.zip) Further discussions on discard operation for XR Futurewei discussion Rel-18 NR\_XR\_enh-Core

[R2-2306121](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2306121.zip) Discussion on PDU Set discard in PDCP layer for DL and UL ASUSTeK discussion Rel-18 NR\_XR\_enh-Core

[R2-2306137](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2306137.zip) Discussion on PDU set discarding for XR traffic Huawei, HiSilicon discussion Rel-18 NR\_XR\_enh-Core

[R2-2306331](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2306331.zip) Discussion on the discard for XR LG Electronics Inc. discussion NR\_XR\_enh-Core

[R2-2306402](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2306402.zip) Discussion on PDU Discard Operation for XR Meta USA discussion Rel-18 NR\_XR\_enh-Core

#### 7.5.4.3 Configured Grant enhancements for XR

Including RAN2-specific aspects of Multiple Configured Grant (CG) PUSCH transmission occasions in a period of a single CG PUSCH configuration.

Including RAN2-specific aspects of dynamic indication of unused CG PUSCH occasion(s) based on Uplink Control Information (UCI) by the UE.

Including discussion on retransmission-less CG, e.g. how does the solution discussed in RAN2#121bis-e ensure consistent HARQ operation?

Online (Tuesday) (2) – Retransmission-less CG for XR

Retransmission-less CG (already discussed in RAN2#121bis-e):

[R2-2304809](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2304809.zip) Discussion on retransmission-less CG for XR Huawei, Apple, Futurewei, Google, HiSilicon, Intel, Lenovo, MediaTek, Meta, Qualcomm discussion Rel-18 NR\_XR\_enh-Core

*Review of NTN solution*

*Observation1: Retransmission-less NTN solution is applied for certain HARQ processes carrying services that do not require HARQ retransmission for both CG and DG.*

*Why HARQ RTT Timer should not be disabled for DG*

*Observation2: For pose control information, retransmission by PDCCH addressed to CS-RNTI should be allowed that the DRX RTT/ReTx timer should not be disabled per HARQ process for both CG/DG.*

*Observation3: Retransmission for UL grant scheduled by PDCCH addressed to C-RNTI that share the same HARQ process as CG carrying pose control information should not be disabled.*

*Proposed Way-forward*

*Observation4: The legacy logical channel restriction allowedCG-List can be reused for retransmission-less CG*

*Proposal1: For retransmission less CG enhancement in XR, adapt the NTN solution by disabling the HARQ RTT timer per CG configuration. Specifically, the following modifications shall be introduced:*

*• A new RRC parameter for disabling drx-HARQ-RTT-TimerUL for a CG configuration;*

*• Changes in the procedural text of DRX operations for CG in the MAC specification;*

*• A new UE capability for supporting disabling drx-HARQ-RTT-TimerUL for a CG configuration.*

[R2-2305654](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2305654.zip) Retransmission-less operation Nokia, Nokia Shanghai Bell discussion Rel-18 NR\_XR\_enh-Core

*Proposal 1: reuse the mechanism from NTN with retransmission-less operation supported for both dynamic grant and configured grant, thus no new RRC parameter and capability is needed.*

*Proposal 2: update the DRX section in MAC to start drx-HARQ-RTT-TimerUL only for HARQ mode A and remove the restriction of limiting the uplink-Harq-ModeB capability to NTN, as TP provided in the annex.*

[R2-2305741](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2305741.zip) Discussion on retransmission-less CG Samsung discussion Rel-18 NR\_XR\_enh-Core

[R2-2305517](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2305517.zip) Options for Retransmission-less CG for XR traffic Sony discussion Rel-18 NR\_XR\_enh-Core

Online (Tuesday) (1) – RAN2 aspects of RAN1 work on UTO-UCI

RAN2 aspects of configured grant enhancements specified in RAN1:

[R2-2304713](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2304713.zip) Configured grant enhancements for XR Qualcomm Incorporated discussion Rel-18 NR\_XR\_enh-Core

*Proposal 1. Whether/when to send skipping indication for a CG occasion is a decision made by MAC entity based on availability of L2 data. The related UE behaviors should be discussed by RAN2.*

*Proposal 2. Even if UE has previously indicated that it will not skip a CG occasion, UE is still allowed to skip that CG occasion if no eligible data is available in that slot.*

*Proposal 3. UE is allowed to change its indication for a future CG occasion in any UTO-UCI transmitted up to that occasion.*

*Proposal 4. If UE indicates in CG occasion #n that it will skip occasion #n+1, then UE is not allowed to transmit over occasion #n+1, even if there is data eligible for the CG in occasion #n+1.*

*Proposal 5. If UTO-UCI is absent in a CG PUSCH transmission (e.g. due to intra-UE prioritization), network should consider that the UE may use the corresponding CG occasion(s).*

*Proposal 6. If UE has a UCI overlapping with a CG occasion and does not have any UL data eligible for the CG occasion, UE can send skipping indication before the CG occasion and transmit the UCI over PUCCH. UE is not required to transmit over PUSCH in this case.*

[R2-2306206](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2306206.zip) Discussion on multiple-PUSCHs CG for XR TCL Communication discussion Rel-18

*Proposal 1: the solution for multiple-PUSCHs CG configuration should be similar as that for DRX configuration which is being discussed*

*Proposal 2: the number of CG PUSCH transmission occasions and/or the interval between two adjacent CG PUSCH transmission occasions in a period could be configured by high layer differently for different Types of CG and TDRA alternatives*

*Proposal 3: a special BSR or other MAC CE could be generated in MAC to trigger the first CG PUSCH transmission with the UTO-UCI when no XR traffic data for the first CG PUSCH transmission occasion*

*Proposal 4: a BSR could be used to request supplementary DG in the case where CG resources are insufficient and the potential additional delay for the DG could be FFS*

[R2-2305605](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2305605.zip) Consideration on Retransmission less CG on XR CMCC discussion Rel-18 NR\_XR\_enh-Core

*Retransmission-less CG aspect:*

*Observation 1: uplink-Harq-ModeB-r17 and uplinkHARQ-mode can be reused for retransmission-less CG for XR in TN.*

*Observation 2: Reusing uplink-Harq-ModeB-r17 and uplinkHARQ-mode can support retransmission-less transmission for both CG and DG and offer a flexible compromise between power consumption and reliability.*

*Proposal 1: RAN2 to support retransmission-less CG by reusing uplinkHARQ-mode and uplink-Harq-ModeB in TN.*

*Proposal 2: RAN2 to introduce reliability assurance mechanism for retransmission-less CG, e.g., blind retransmission, using LowSE MCS table.*

*Multiple-TOs aspect:*

*Proposal 3: NW (RRC) can configure the number of transmission occasions (TOs) within one CG period in multi-PUSCHs CG configuration.*

*Observation 3: Uneven interval between TOs is more appreciated since jitter obeys Poisson distribution other than Uniform distribution.*

*Observation 4: Too many multi-PUSCHs CG TOs can cause overhead and difficulty in indicating unused CG PUSCH TOs.*

*Proposal 4: NW (RRC) can configure the interval between TO within one CG period, and the intervals can be uneven. FFS configure all intervals or the step of interval (scale factor).*

*Proposal 5: UE can be allocated multiple TOs within one CG period for better adaptation the jitter caused by jitter in data volume for data burst.*

*Observation 5: When the TBS of data burst exceeds that of single TO within one CG period, using multiple TOs within one CG period can reduce overall latency but may have impacts on RAN1, while using single TO+DG has no specification impact but could increase latency.*

*Proposal 6: RAN2 is kindly asked to discuss how to transfer data burst in uplink when its TBS exceeds single TO in Multi-PUSCHs CG:*

*Opt1: using multiple TOs within one CG period firstly, if all TOs are still not enough, use DG.*

*Opt2: using single TO+DG. FFS whether to send UTO indication for less latency.*

*Indication of UTO aspect:*

*Proposal 7: MAC entity is responsible for recognize unused CG TO(s) and signaling PHY.*

*Proposal 8: UTO-UCI should be sent as soon as possible for UTO recycling, while if there left little time for NW recycling, UE can omit to send UTO-UCI.*

*Proposal 9: RAN2 is kindly asked to discuss whether to allow UTO indication be multiplexed in MAC PDU, if exists.*

Online (Tuesday) (1) – RAN2 aspects of RAN1 work on HARQ ID determination

[R2-2306185](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2306185.zip) HARQ ID determination formula for CG MediaTek Inc. discussion Rel-18

*Observation 1: Modifications to HARQ ID determination formula is expected to be defined mostly in the MAC layer specification with zero or very minor L1 specification impact.*

*Proposal 1: RAN2 shall continue discussions on the modifications to the HARQ ID determination formula for CG due to multiple PUSCH occasions.*

[R2-2304971](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2304971.zip) Enhancements for configured grant CATT discussion Rel-18 NR\_XR\_enh-Core

*Observation 1: The NTN specification of retransmission-less CG can easily be extended to terrestrial networks with only editorial revisions.*

*Proposal 1: For retransmission-less CG, the NTN solution is reused as is, i.e. network disables the HARQ RTT timer per HARQ process associated with the target CG configuration.*

*Proposal 2: RAN2 leaves to RAN1 the design of the determination of HARQ process IDs associated to PUSCHs in multi-PUSCHs CG assuming one TB per PUSCH.*

*Observation 2: MAC will need to feed L1 with UTO contents.*

*Proposal 3: RAN2 study the MAC impacts from providing L1 with the expected usage of CG PUSCH transmission occasions (aka UTO-UCI).*

[R2-2304919](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2304919.zip) Discussion on CG enhancements for XR vivo discussion Rel-18 NR\_XR\_enh-Core

[R2-2305020](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2305020.zip) Configured Grant enhancements for XR ZTE Corporation, Sanechips discussion

[R2-2305075](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2305075.zip) Views on Configured Grant Enhancements for XR Apple discussion Rel-18 NR\_XR\_enh-Core

[R2-2305161](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2305161.zip) Configured Grant enhancements for XR InterDigital discussion Rel-18 NR\_XR\_enh-Core

[R2-2305516](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2305516.zip) Configured Grant enhancements for XR Sony discussion Rel-18 NR\_XR\_enh-Core

[R2-2305535](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2305535.zip) Discussion on configured grant enhancement for XR OPPO discussion Rel-18 NR\_XR\_enh-Core

[R2-2305538](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2305538.zip) On Configured Grant enhancements for XR Google Inc. discussion

[R2-2305725](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2305725.zip) Details of CG enhancements for XR communications Lenovo discussion Rel-18 NR\_XR\_enh-Core

[R2-2306266](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2306266.zip) Configured Grant enhancements for XR Ericsson discussion Rel-18 NR\_XR\_enh-Core

[R2-2306272](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2306272.zip) Discussion on Configured Grant enhancements for XR III discussion NR\_XR\_enh-Core

[R2-2306347](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2306347.zip) Discussion on CG enhancement for XR LG Electronics Inc. discussion Rel-18 NR\_XR\_enh-Core

## 7.14 Enhancement on NR QoE management and optimizations for diverse services

(NR\_QoE\_enh-Core; leading WG: RAN3; REL-18; WID: RP-223488)

Time budget: 0.5 TU

Tdoc Limitation: 3 tdocs

Prioritization of topics TBD based on input tdocs.

### 7.14.1 Organizational

Including LSs and any rapporteur inputs (e.g. work plan)

Online (Tuesday) (1) – Work plan

Work plan:

[R2-2306476](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2306476.zip) Revised Work Plan for Rel-18 NR QoE Enhancement China Unicom Work Plan NR\_QoE\_enh-Core

* Endorsed (will attempt to provide initial version of 37.340 during the meeting)

Online (Tuesday) (1+1+2) - LSs

RAN3 LS on assistance information during RAN overload:

[R2-2304625](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2304625.zip) LS on the feasibility of introducing assistance information for handling of QoE reporting during RAN overload (R3-232047; contact: ZTE) RAN3 LS in Rel-18 NR\_QoE\_enh-Core To:SA5 Cc:RAN2

- Lenovo thinks we can wait for SA5 conclusion before RAN2 discussion.

* Noted (RAN2 in CC, no actions until SA5 reply)

SA5 LS on MBS service area:

[R2-2304626](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2304626.zip) LS on collecting QoE measurements per MBS service area and MBS session ID (R3-232079; contact: Huawei) RAN3 LS in Rel-18 NR\_QoE\_enh-Core To:SA5 Cc:RAN2

* Noted (RAN2 in CC, no actions until SA5 reply)

SA4 LS on buffer-level threshold-based RVQoE reporting (received late in RAN2#121bis-e)

[R2-2304658](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2304658.zip) Reply LS on buffer level threshold-based RVQoE reporting (S4-230684; contact: Apple) SA4 LS in Rel-18 NR\_QoE\_enh-Core To:RAN2 Cc:RAN3

*SA4 thanks RAN2 on their LS on buffer level threshold-based RVQoE reporting. Given that*

*• There already exists mechanism before Rel-18 for application layer to be configured for QoE reporting, and that this mechanism can be reused by the application layer to do RVQoE reporting based on the trigger of the buffer level threshold, and*

*• The application layer can make a buffer-threshold based decision in a more timely fashion compared to the AS layer, since the corresponding application layer reporting, based strictly on reporting periodicity, may be unable to submit QoE reports at the exact time that buffer level threshold is reached. As result, and depending on the reporting periodicity, the delay between a threshold occurrence and the next scheduled QoE report may precluding a more timely remedial response by the gNB.*

*Hence SA4 can confirm RAN2 preference that application layer triggering of buffer level threshold-based RVQoE reporting can be supported in Rel-18 based on the corresponding QoE configuration received from the AS layer.*

- Apple thinks RAN3 is still discussing the mechanisms of the reporting so we should wait.

- Huawei agrees.

* Noted

Online (Tuesday) (1) – Running CRs

[R2-2305381](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2305381.zip) Running CR for QoE measurements Ericsson draftCR Rel-18 38.331 17.4.0 NR\_QoE\_enh-Core

* Companies are encouraged to provide comments on the CR to rapporteur(s) already during the meeting (i.e. before any post-meeting email discussion)

### 7.14.2 QoE measurements in RRC\_IDLE INACTIVE

Including discussion on handling area scope for MBS QoE (i.e. is it done by AS or AL, whether the same mechanism applies for all RRC states, etc.)

Including discussion on AS layer buffer size (e.g. how many values, what is the minimum value).

Including discussion on what AS layer stores in IDLE/INACTIVE and what exactly is sent to AL.

Online (Tuesday) (2) – Area scope, delta signalling and QoE configuration release

[R2-2306396](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2306396.zip) Discussion on QoE measurements in RRC IDLE and INACTIVE state CATT discussion Rel-18 NR\_QoE\_enh-Core

*Observation 1: In Rel-17, the network will always handle the area scope checking and no LocationFilter will be specified in QoE configuration when UE is in RRC\_CONNECTED state.*

*Proposal 1: When UE is in RRC\_CONNECTED state, we can reuse the Rel-17 mechanism to check area scope, i.e. the network is responsible to check area scope of QoE measurement for broadcast.*

*Proposal 2: When UE is in RRC\_IDLE or RRC\_INACTIVE state, UE AS layer is responsible to check area scope of QoE measurement for broadcast.*

*Proposal 3: When UE enters RRC IDLE/INACTIVE state, UE AS layer should store the content of QoE configuration for broadcast service including:*

*- MeasConfigAppLayerId*

*- Service type*

*- Pause reporting*

*- Session start/stop*

*- Area socpe information*

*- MBS session ID(FFS)*

*- RV QoE parameters(FFS)*

*Proposal 4: If RAN3 choose the UE-based solution, the UE AS layer may also need to store the following content:*

*- QoE reference*

*- MCE information*

*- QoE measurement type*

*- MDT alignment information (FFS)*

*Proposal 5: We can assume that the minimal memory size for QoE report generated in IDLE/INACTIVE states should be larger than 64KB, such as 256KB and send LS to SA4/SA5 to confirm.*

* Focus on P1-2

[R2-2305809](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2305809.zip) Discussion on QoE measurements for MBS broadcast services Huawei, HiSilicon discussion Rel-18 NR\_QoE\_enh-Core

*Area scope checking*

*Observation 1: SA4 specifications already provide a readily available solution for handling QoE measurement area scope for MBS broadcast services. No specifications changes are required to support it, neither in SA4 nor in RAN2.*

*Observation 2: There are no technical issues with using application layer area scope checking for QoE of MBS broadcast services.*

*Observation 3: When LocationFilter is configured, the application layer always considers it, as per the current SA4 specifications. There is no need for the NW to perform area scope checking for the UE in RRC CONNECTED state in that case, but there are also no issues in case the network wants to do that.*

*Observation 4: It is inefficient and unusual to specify two different solutions to address exactly the same issue.*

*Proposal 1: RAN2 to discuss whether there are any benefits of specifying AS layer area scope handling compared to the existing application layer area scope handling which would justify the additional specifications efforts.*

*Proposal 1: When UE is in RRC\_CONNECTED state, we can reuse the Rel-17 mechanism to check area scope, i.e. the network is responsible to check area scope of QoE measurement for broadcast.*

*Proposal 2: When UE is in RRC\_IDLE or RRC\_INACTIVE state, UE AS layer is responsible to check area scope of QoE measurement for broadcast.*

Coffee break offline (Samsung): Discuss area scope open questions and whether there is need to send LS to SA5/SA4/RAN3

- Samsung reports that there is consensus to send LS to SA5 with 3 questions:

* Send LS to SA5, SA4, RAN3 about the feasibility of area scope checking only in AL. Ask questions on:

1) So far SA5 has restriction that area scope and LocationFilter cannot be provided simultaneously. Ask if this can be removed so gNB can select the UEs?

2) Ask RAN3 if provision of area scope to gNB can be optional?

3) If PLMN/TA information is needed, is it feasible to include those in LocationFilter?

4) SA4: Is there a problem with redundant checks (ie. both NW and UE AL)?

FFS if something can be asked about polygons.

* Offline 201 (Samsung): LS to SA5

- QC thinks AL is already aware of the geographic area so could do the checking, but not sure RAN2 can decide on AL. Ericsson thinks AL solution requires addition of PLMN/TA to the information. Also thinks switching between UE and NW handling is difficult. if UE does the area checking in CONNECTED, NW is not aware of the UE selection. Huawei thinks there is no need to switch if UE does it always. OAM will configure it for both UE and NW. That is now NW is aware of the area scope. In CONNECTED NW knows where the UE is. Agrees that adding PLMN/TA scope would be something that might be needed but is not sure and needs to be asked.

- Ericsson wonders what the benefit of doing this in AL is?

- China Unicom thinks AL solution has some disadvantages since AL needs to send information to AS. using different procedures for different service types is not easy.

- Nokia thinks in CONNECTED should be done by network since that’s the legacy. SA4 indicated the checking is only done at the start of the session. Thinks it’s easier if only one entity does.

- QC thinks it’s possible to allow both AL and AS but let OAM choose which is used.

- Huawei thinks we have a different mechanism now compared to before. Sees no problem for UE to manage the area scope also in CONNECTED even of UE has LocationFilter. With AS layer solution there is some information exchance when area scope validity changes. Samsung also prefers a unified solution but is concerned about PLMN/TA in LocationFilter.

*QoE buffer handling*

*Observation 5: The memory requirements for storing QoE reports generated for MBS broadcast in RRC\_IDLE/INACTIVE states will be much higher than in case of pause due to RAN overload.*

*Proposal 2: RAN2 will introduce UE capability signaling for support of QoE reports buffer size(s) larger than 64kB. Exact values to be supported FFS.*

*Proposal 3: RAN2 agrees that assistance information for the UE to decide which reports to discard in case the UE’s QoE buffer becomes full is useful. RAN2 should wait for RAN3 conclusion on the contents of assistance information provided from OAM to RAN before working on the details.*

*QoE configuration storage*

*Observation 6: RAN3 conclusion on whether the required QoE information (e.g. QoE reference, MCE Information) should be provided to the new gNB from the UE or from the CN is needed to decide what exactly needs to be stored at the UE AS layer when the UE moves to RRC IDLE state.*

*Proposal 4: RAN2 to discuss whether delta configuration of the QoE configuration applied in RRC IDLE needs to be supported when the UE moves to RRC CONNECTED state.*

*Proposal 5: Timer based QoE configuration release is not supported, i.e. the UE stores the IDLE/INACTIVE QoE configuration until it is released by the network.*

- Samsung thinks RAN3 is discussing UE and CN-based solutions already. With UE-based solution delta is not possible. Ericsson thinks or IDLE delta is not needed but INACTIVE it is. Should avoid changes. Huawei agrees for INACTIVE.

- Qualcomm thinks delta configuration is beneficial. Ful configuration can make the QoE to stop or restart. Huawei thinks this is not the case: In R17 gNB had to provide full config already, and RAN2 agreed to allow AS layer not to reconfigure AL.

* 4: Do not support delta configuration of the QoE configuration applied in RRC IDLE when the UE moves to RRC CONNECTED state unless it causes issues for QoE AL continuity in state transition.

- Lenovo thinks that for IDLE, UE has to keep the configuration until it powers off or goes to CONNECTED. Also wonders what happens to the stored reports. Could also have some issues with inter-RAT. For logged MDT we had a 48h timer for the report.

- China Unicom thinks we discussed this already. Qualcomm has concern for P5 with m-based QoE where it’s not possible to release the configuration.

- Ericsson is fine with the proposal but understands the concern. Could be fine with MDT-like timer. ZTE thinks we sent LS to SA4 on time requirement and they said there was none. Lenovo thinks SA5 replied that latest one was more important.

- Nokia is fine for with P5 and thinks it should be in NW control to release. CATT agrees with Lenovo that this increases power consumption.

* 5: UE is allowed to release stored reports and configuration after 48h (similar to logged MDT). No timer is configured by the network.

*Selection of UEs for MBS QoE configuration*

*Observation 7: Forcing the gNB to utilize blind configuration of MBS broadcast QoE to all MBS capable UEs is sub-optimal for both the UE and the network in terms of signaling overhead, memory/storage requirements, predictability of receiving QoE measurements etc.*

*Proposal 6: RAN2 should investigate the means for the gNB to identify which UEs should be provided with MBS broadcast QoE configuration for a specific MBS session via, e.g.:*

*1. Allowing the network to indicate to the UE the IDs of MBS broadcast sessions for which it is interested in receiving QoE measurements.*

*2. The UE indicating to the network when the UE is configured with or receiving/starting to receive the indicated MBS sessions.*

*QoE configuration details*

*Observation 8: Considering SA4 input, MBS cannot be treated as a separate QoE service type as MBS is a transmission mean which is used to deliver existing service types.*

*Proposal 7: RAN2 should wait with the decision on whether to introduce explicit indication about the QoE applicability to RRC IDLE/INACTIVE until it is clear whether MBS session IDs need to be included in the QoE configuration (pending SA5 input and RAN3 decision).*

*QoE reporting details*

*Observation 9: Resuming/setting up an RRC connection just for the sake of reporting QoE brings no benefits while it causes MBS broadcast service performance deterioration, increases signaling overhead, impacts UE battery life and brings additional complexity.*

*Proposal 8: The UE does not setup/resume RRC connection just for QoE reporting, i.e. the QoE reports are sent to the network when the UE moves to RRC\_CONNECTED state due to other reasons.*

* Focus on P1 (area scope), P4-5 (delta signalling and QoE release timer)

Online (Tuesday) (2) – MBS QoE applicability to RRC states, SIB information and UE buffer sizes

[R2-2305076](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2305076.zip) QoE Measurements in IDLE/INACTIVE States Apple discussion Rel-18 NR\_QoE\_enh-Core

*Proposal 1: If a new service type of MBS is to be introduced, whether a QoE configuration is also applicable in RRC-IDLE/INACTIVE states can be implicitly indicated by the service type. Otherwise, explicit indication can be used.*

*Proposal 2: Priority level per QoE configuration should be introduced for the UE to decide which QoE report can be discarded first when the buffer becomes full in RRC-IDLE/INACTIVE states.*

*Proposal 3: Send a reply LS to RAN3 to notify that the assistance information for handling of QoE reporting upon RAN overload may also be useful for UE to handle QoE report discarding in RRC-IDLE/INACTIVE states.*

*Proposal 4: Area scope checking should be handled by UE APP in all RRC states.*

* Focus on P1

- Ericsson thinks we could have explicit indicator.

- Lenovo wonders if this indicator is sent to AL? Thinks it could be kept in AS layer.

* 1: As working assumption, RAN2 will use explicit indicator in AS-layer on whether a QoE configuration is also applicable in RRC-IDLE/INACTIVE states. Can be revisited if RAN3 decides to introduce a service type.

[R2-2305310](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2305310.zip) Discussion on QoE measurement in RRC\_IDLE and RRC\_INACTIVE Samsung discussion Rel-18 NR\_QoE\_enh-Core

*Proposal 1. NW indicates via SIB1 whether it supports Rel-18 QoE measurement. Only if this indicator is received, UE is allowed to report availability indicator.*

- Lenovo is fine with SIB1 indicator but thinks it’s only whether UE is allowed to send the indicator. Huawei thinks UE can just send the indicator and if NW doesn’t understand it, it will ignore it (i.e. not configured SRB4). Nokia agrees. CMCC agrees. CATT, ZTE, Ericsson agrees.

- Lenovo thinks network may not retrieve the reports even if UE sends the indicator. Does it then repeat the indicator?

- Samsung thinks that this is about UE side and not network. But there is no critical issue.

* 1. Do not introduce SIB1 indicator on whether UE is allowed to indicate presence of QoE measurements. UE always indicates if it has stored QoE report(s), and it’s up to network whether/when to retrieve them.

*Proposal 2. Introduce 1 bit indicator (separate from serviceType) in QoE configuration to indicate whether it is for MBS broadcast service or not.*

*Proposal 3. If QoE configuration indicates MBS broadcast, UE performs corresponding QoE measurement in all RRC states. Otherwise (i.e., if QoE configuration does not indicate MBS broadcast), UE performs corresponding QoE measurement only in RRC\_CONNECTED.*

*Proposal 4. Introduce AS layer minimum memory requirement for storing QoE reports measured in RRC\_IDLE/RRC\_INACTIVE, which is separate from the Rel-17 memory requirement (i.e., 64KB) for storing paused QoE reports.*

*Proposal 5. Define an UE capability with values {64KB, 128KB, 256KB, 512KB} for separate Rel-18 AS layer minimum memory requirement. UE supporting QoE measurement for MBS broadcast shall indicate one of those values as UE capability. The exact range of the values can be discussed or checked with other groups.*

- Lenovo thinks 64 kB is anyway too low and is not sure how the proposed values were derived. Do we assume UE can be configured with up to 16 reports?

- Ericsson agrees the number of configurations affects the memory size. Thinks 64 kB is too low.

- QC is fine with separate capability for larger size. China Unicom thinks 64 kB as minimum size is fine.

* Introduce AS layer minimum memory requirement for storing Rel-18 QoE reports measured in RRC\_IDLE/RRC\_INACTIVE. Could have larger values than in Rel-17. FFS what is the minimum size requirement capability. FFS what is the value range of the capability.

*Proposal 6. As baseline, LocationFilter can be used for area scope of QoE configuration for MBS broadcast.*

*Proposal 7. Discuss whether to define AS layer area scope:*

*- Option 1. AS layer area scope is not defined. LocationFilter is mandatory in QoE configuration for MBS broadcast.*

*- Option 2. AS layer area scope can be configured if LocationFilter is absent. (i.e., UE APP performs QoE measurement anywhere, but UE AS discards QoE reports received from UE APP based on configured AS area scope)*

*Proposal 8. Area scope is checked by UE in all RRC states.*

*Proposal 9. UE can send QoE report or availability indicator outside (or regardless) of the area scope (i.e., LocationFilter or AS layer area scope).*

*Proposal 10. Support QoE measurement per MBS broadcast session.*

*Proposal 11: RAN2 discusses the signalling-based QoE override protection, and makes a way-forward.*

* Focus on P1-5

Online (Tuesday) (1) – UE capabilities

[R2-2305606](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2305606.zip) Consideration on QoE measurement in RRC\_IDLE/INACTIVE CMCC discussion Rel-18 NR\_QoE\_enh-Core

*QMC configuration and release aspect:*

*Observation 1: Paging mechanism can be reused for QoE configuration release in RRC\_IDLE/RRC\_INACTIVE*

*Proposal 1: QoE measurement configuration release via broadcast signaling is not support in R18.*

*Observation 2: As a service type, MBS/MBS BC can be served as an implicit indication for QoE configuration in RRC\_IDLE/RRC\_INACTIVE, but RAN3 has not decided that.*

*Proposal 2: Potstone the discussion on indicator for QoE configuration in RRC\_IDLE/RRC\_INACTIVE until RAN3 has conclusion on whether MBS/MBS BC is a service type, FFS send LS to RAN3.*

*Proposal 3: gNB should select UE(s) both are capable for MBS QoE in RRC\_IDLE/RRC\_INACTIVE and configured with MBS.*

*Proposal 4: RAN2 is kindly asked to discuss which message can determine whether UE shall perform MBS in RRC\_IDLE/RRC\_INACTIVE to match and select UE for MBS QoE configuration,*

*Proposal 5: RAN2 waits for RAN3's conclusion on whether to support RVQoE in RRC\_IDLE/RRC\_INACTIVE.*

*QoE configuration storage aspect:*

*Observation 3: Based on previous conclusion from RAN2 and RAN3, UE should store service type and QoE reference, RRC level ID, MCE info and QoE configuration container. RAN3 is discussing more parameters in RRC\_IDLE/RRC\_INACTIVE.*

*Proposal 6: AS layer stores QoE reference, RRC level ID (measConfigAppLayerId), MCE info in RRC\_IDLE.*

*Proposal 7: For per-slice QoE, RVQoE, Alignment with MDT, RAN2 waits for RAN3's conclusion.*

*UE capability aspect:*

*Proposal 8: Introduce an independent UE capability for QoE in RRC\_IDLE/RRC\_INACTIVE regardless of service type.*

*Proposal 9: Reuse 64KiB AS buffer size for paused QoE is the baseline for QoE report storage in RRC\_IDLE/RRC\_INACTIVE.*

*Proposal 10: Introduce a UE capability for QoE in RRC\_IDLE/RRC\_INACTIVE indicates whether UE support additional AS buffer size for QoE in RRC\_IDLE/RRC\_INACTIVE, FFS extra AS buffer size is fixed or not.*

*Area scope handling aspect:*

*Observation 4: LocationFilter in QoE container (APP layer) and area scope (AS layer) can be configured simultaneously.*

*Proposal 11: NW can provide UE with area scope information (e.g., Cell ID, TAC, Area scope configuration) for RRC\_IDLE/RRC\_INACTIVE, if necessary.*

* Focus on P8-10

[R2-2305138](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2305138.zip) Discussion on support of QoE measurements in RRC\_IDLE and RRC\_INACTIVE Lenovo discussion Rel-18 NR\_QoE\_enh-Core

[R2-2305382](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2305382.zip) QoE measurements in RRC\_INACTIVE and RRC\_IDLE Ericsson discussion Rel-18 NR\_QoE\_enh-Core

[R2-2305755](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2305755.zip) QoE measurements support in RRC IDLE and INACTIVE Nokia, Nokia Shanghai Bell discussion Rel-18 NR\_QoE\_enh-Core

[R2-2305766](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2305766.zip) Open issues on QoE collection for IDLE and Inactive state Qualcomm Incorporated discussion NR\_SL\_relay\_enh-Core

[R2-2306107](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2306107.zip) Considerations on QoE measurement in IDLE and INACTIVE ZTE Corporation, Sanechips discussion Rel-18 NR\_QoE\_enh-Core

[R2-2306478](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2306478.zip) Discussion on QoE measurements in RRC\_IDLE and INACTIVE states China Unicom discussion Rel-18 NR\_QoE\_enh-Core

### 7.14.3 Rel-17 leftover topics for QoE

Including discussion on Rel-17 leftover topics as agreed in previous meetings.

Online (Tuesday) (1) – Need to reply to RAN3 on overload handling?

[R2-2305077](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2305077.zip) [DRAFT] Reply LS on assistance information for handling of QoE reporting upon RAN overload Apple LS out Rel-18 NR\_QoE\_enh-Core To:RAN3

*(moved from 7.14.2)*

*RAN2 thanks RAN3 for the LS on assistance information for handling of QoE reporting upon RAN overload. RAN2 would like to inform that, such information may also be useful if it is provided to the UE. For instance, the UE may use the priority levels associating to QoE configurations to decide which QoE measurement report should be discarded when the AS buffer becomes full in RRC-IDLE/INACTIVE states.*

* Noted

Online (Tuesday) (2) – Are RRC events needed for buffer level threshold - based RVQoE reporting?

[R2-2306109](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2306109.zip) Considerations on Rel-17 leftover issues for QoE ZTE Corporation, Sanechips discussion Rel-18 NR\_QoE\_enh-Core

*Proposal 1: RAN2 doesn’t discuss further enhancements (i.e. UE-based solution other than pause/resume) to deal with RAN overload*

*Proposal 2: Confirms that buffer level threshold-based triggering of RVQoE reporting is triggered by application layer.*

*Proposal 3: RAN2 waits for RAN3’s conclusion on the buffer level threshold-based RVQoE reporting.*

*Proposal 4: Introduce a buffer level threshold information in the RVQoE configuration from the gNB.*

[R2-2305384](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2305384.zip) Event based RVQoE reporting Ericsson discussion Rel-18 NR\_QoE\_enh-Core

*Observation 1 In the RAN3#118 meeting the following was agreed: Turn the WA to agreement: Introduce buffer level as a threshold-based trigger for RVQoE reporting. This agreement is like option 1 from RAN2119bis, suggesting introduction of a new event for RVQOE reporting, where the trigger for the event is the BufferLevel below a configured threshold.*

*Observation 2 Option 4, i.e., using RVQoE metrics fulfilling certain conditions as triggers for RVQoE reporting, encompasses options 1 to 3 as well and provides easier extensions of the list of trigger events in the future.*

*Observation 3 Option 6 may result in limited usefulness of RVQoE to RAN for real-time radio resources’ optimization.*

*Proposal 1 Consider using RVQoE metrics fulfilling certain conditions, as triggers for RVQoE reporting.*

*Proposal 2 The UE application layer evaluates whether conditions for the event- or threshold- triggered RVQoE reporting are met before the RVQoE report is sent to RAN.*

*Proposal 3 Events in UE AS layer can trigger event-based RVQoE reporting. FFS on the type of events.*

- Huawei thinks we should go with AL events only. NEC thinks AS layer events are beneficial. QC agrees with ZTE. Apple thinks Ericsson proposals are a bit different than ZTE proposals. Thinks ZTE proposals are fine and radio-related events are not supported by RAN3.

- CATT thinks priority information is still beneficial for UE but that is undecided in RAN3. Apple thinks assistance information could be useful for IDLE but not for RAN overload. Huawei thinks introducing assistance information for managing stored reports needs not be restricted to RAN overload. So if we introduce it for other reasons, we can do it and need not wait for RAN3.

- ZTE wonders if UE knows about RAN overload. Thinks assistance information may be beneficial.

- Nokia thinks assistance information can be useful for buffer management. Thinks RAN3 has the same view as well. QC thinks we should still wait for RAN3. Without the assistance information UE doesn’t know. Lenovo thinks this also links to the UE buffer size discussion. We also had default behaviour for storing only latest reports. Thinks specifying different rules is more complicated.

* 2: RAN2 confirms that buffer level threshold-based triggering of RVQoE reporting is triggered by application layer.
* 3: RAN2 waits for RAN3’s conclusion on the buffer level threshold-based RVQoE reporting.

[R2-2305756](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2305756.zip) Discussion on Rel-17 leftovers Nokia, Nokia Shanghai Bell discussion Rel-18 NR\_QoE\_enh-Core

*Observation 1: Given the above-mentioned details, it seems that both RAN2 and RAN3 agree that there is no need for radio-related event triggers for RVQoE reporting.*

*Observation 2: The UE cannot have a clear view on which QoE configuration/reporting has greater importance if no assistance information is provided by network.*

*Observation 3: In case of RAN overload, the released QoE configuration and temporarily paused QoE reporting may have an adverse effect on QoE management and outcome.*

*Observation 4: In case of RAN overload, QoE Pause mechanism enables pausing all the QoE reports simultaneously.*

*Proposal 1: Since SA4 LS reply confirmed that for buffer level threshold-based RVQoE reporting the UE APP layer will be responsible, any discussion with respect to the buffer level threshold should be initially discussed in SA4.*

*Proposal 2: RAN2 to wait RAN3 and SA4 progress before making any decision with respect to how the UE sends the RVQoE reports after the threshold is met.*

*Proposal 3: RAN2 to confirm and align with RAN3’s agreement of not supporting radio-related event triggers for RVQoE reporting in Rel-18.*

*Proposal 4: RAN2 to wait for SA5’s reply on QoE assistance information before proceeding further on solutions for RAN overload scenarios.*

IF time allows: Online (Thursday) (1) – Do we support QoE for shared spectrum?

[R2-2305015](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2305015.zip) Application Layer Measurement Reporting for unlicensed spectrum Samsung Electronics Co., Ltd discussion Rel-18 NR\_QoE\_enh-Core

*Proposal 1: Application layer measurement configuration and reporting for shared spectrum channel access is supported in R18.*

*Proposal 2: RAN2 to discuss and agree on one of the following for CAPC of SRB4:*

*Option 1: Fix the CAPC of SRB 4 to highest priority (similar to SRB 0, SRB 1 and SRB 3)*

*Option 2: CAPC of SRB4 can be signaled by gNB in RRCReconfiguration message (similar to SRB2)*

*Proposal 3: Introduce a new UE capability indicating that UE supports application layer measurement configuration and reporting for shared spectrum channel access.*

*-* QC thinks this is out of Rel-18 scope. China Unicom confirms this is not in Rel-18 scope.

* 1: Application layer measurement configuration and reporting for shared spectrum channel access is not supported in R18.

[R2-2305139](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2305139.zip) Discussion on Rel-17 leftover topics for QoE Lenovo discussion Rel-18 NR\_QoE\_enh-Core

[R2-2305362](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2305362.zip) Discussion on Rel-17 leftover issues for QoE NEC discussion Rel-18 NR\_QoE\_enh-Core

[R2-2305811](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2305811.zip) Discussion on Rel-17 left-over issues Huawei, HiSilicon discussion Rel-18 NR\_QoE\_enh-Core

[R2-2306397](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2306397.zip) Discussion on Rel-17 leftover topics for QoE CATT discussion Rel-18 NR\_QoE\_enh-Core

### 7.14.4 Support of QoE measurements for NR-DC

Including discussion on granularity of QoE reporting (e.g. per QoE config or something else)

Including disucssion on how MN knows to corrrectly forward SN-associated QoE reports received via SRB4

Including discussion on how to achieve splitting of QoE configuration identities between MN and SN.

Including discussion on different m-based QoE configurations for MN/SN (pending RAN3 decisions).

Online (Tuesday) (2) – Configuration of SRB usage

[R2-2306477](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2306477.zip) Discussion on QoE configuration and reporting for NR-DC China Unicom discussion NR\_QoE\_enh-Core

*Observation 1: If RAN3 agrees that MN and SN shares a same MCE, UE can transmit the SN-associated QoE reports via SRB4 directly in the case of that SCG is not activated.*

*Proposal 1: The network can use one bit indication per QoE config to indicate the SRB for the QoE reporting if both SRB4 and SRB5 are configured.*

*Proposal 5: In the case only one of SRB4 or SRB5 is configured for the UE, the UE transmits all the QoE reports directly to the node where SRB4 or SRB5 is configured without any explicit indication from the network.*

*Proposal 6: In the case both SRB4 and SRB5 are configured, the network can explicitly indicate SRB switching.*

*Proposal 2: For NR-DC, if SRB5 is not configured, whether MN directly forwards the received encapsulated QoE reports to the MCE or to the SN depends on RAN3’s decision.*

*Proposal 3: For NR-DC, if SCG is deactivated, whether UE can transmit the SN-associated QoE reports via SRB4 directly depends on RAN3’s decision.*

*Proposal 4: For NR-DC, MN splits RRC IDs and assigns them to the SN for QoE configuring to the UE.*

[R2-2305810](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2305810.zip) Discussion on QoE measurements in NR-DC Huawei, HiSilicon discussion Rel-18 NR\_QoE\_enh-Core

*Observation 1: RAN3 has made some progress regarding “How MN forwards SN-associated QoE reports received via SRB4”, and RAN2 can rely on RAN3 on solving the issue.*

*Observation 2: MN knows whether the measurement report needs to be forwarded to SN based on MN-SN coordination and by knowing the measConfigAppLayerId of the report.*

*Observation 3: Using MN ULInformationTransferMRDC message for sending the SN MeasurementReportAppLayer may increase the delay and signaling overhead of RVQoE transfer.*

*Observation 4: If RAN3 has more progress on “WA: QoE reports and RVQoE reports pertaining to the same QoE reference can be sent over different legs.”, RAN2 may need to discuss possible impacts.*

*Observation 5: There is already a possibility for the RAN to change the reporting leg of the QoE configuration and it is unclear why pause indication should be used for that.*

*Observation 6: For the UE selection of reporting SRB:*

*- For a single QoE SRB (i.e. one of SRB4 or SRB5 is configured for the UE), implicit indication can work*

*- For two QoE SRBs (i.e. both SRB4 and SRB5 are configured for the UE), explicit indication can work*

*No extra impacts are foreseen.*

*Proposal 1: The explicit indication of SRB for the QoE reporting is configured per RRC ID (i.e. measConfigAppLayerId-r17).*

*Proposal 2: If SRB5 is not configured, UE sends the SN QoE results in MeasurementReportAppLayer message via SRB4 and MN forwards them to SN.*

*Proposal 3: RAN visible QoE configuration is generated by the same node which generates the configuration for container based QoE. The other node will not send the RRC message to update/modify the RAN visible QoE configuration which was not configured by this node.*

*Proposal 4: Rel-17 defined pause/resume mechanism is kept, i.e. pause/resume reporting of one or multiple QoE measurement configurations in a UE.*

Online (Tuesday) (1) – MN RRC message used for QoE reporting to SN

[R2-2305383](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2305383.zip) QoE measurements in NR-DC Ericsson discussion Rel-18 NR\_QoE\_enh-Core

*Observation 1 Reusing existing DC procedures for QoE guarantees support in multi-vendor and multi-RAT scenarios and decreases the complexity of the feature.*

*Proposal 1 A MeasurementReportAppLayer message to the SN can be sent embedded in ULInformationTransferMRDC to the MN.*

*Proposal 2 ULInformationTransferMRDC can be sent using SRB4.*

*Proposal 3 The following are the default options for QoE reporting, used unless the UE is instructed otherwise: - If the QoE configuration was included in RRCReconfiguration from the MN, the QoE report is included in MeasurementReportAppLayer to the MN. - If the QoE configuration was included in RRCReconfiguration from the SN, the SN RRCReconfiguration embedded in an MN RRCReconfiguration, the QoE report is included in MeasurementReportAppLayer to the SN, where the SN-bound MeasurementReportAppLayer is embedded in an ULInformationTransferMRDC to the MN. - If the QoE configuration was included in RRCReconfiguration from the SN, sent via SRB3, the QoE report is included in MeasurementReportAppLayer to the SN, sent via SRB5.*

*Proposal 4 Network configuration is needed for the UE to transmit reports to a different node than the default option for reporting.*

*Proposal 5 The RRC reporting instruction for QoE reporting can include the options: - report to MN via SRB4, - report to SN transparently via SRB4, and - report to SN directly via SRB5.*

*Proposal 6 The reporting instruction is configured at least per QoE configuration, i.e. per measConfigAppLayerId. FFS on separate indications for QoE and RVQoE reports.*

*Proposal 7 If the default reporting option is not available and the network didn’t indicate any other reporting option, the UE may discard the QoE reports.*

*Proposal 8 QoE configurations configured by the SN are released in the UE when the SCG is released.*

*Proposal 9 The UE sends a UEAssistanceInformation message indicating that it has UL data to send (according to existing procedures), if the SCG is deactivated when the UE has a QoE report to send.*

*Proposal 10 Discuss if the UE should indicate in UEAssistanceInformation that it is a QoE report that the UE has to transmit.*

* Focus on P1-2

[R2-2305078](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2305078.zip) Discussions on QoE Reporting for NR-DC Apple discussion Rel-18 NR\_QoE\_enh-Core

[R2-2305311](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2305311.zip) Discussion on QoE measurement for NR-DC Samsung discussion Rel-18 NR\_QoE\_enh-Core

[R2-2305479](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2305479.zip) Support of QoE measurements for NR-DC LG Electronics Inc. discussion Rel-18

[R2-2305607](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2305607.zip) Consideration on QoE measurement for NR-DC CMCC discussion Rel-18 NR\_QoE\_enh-Core

[R2-2305757](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2305757.zip) Detailed handling of QoE configuration and reporting in NR-DC Nokia, Nokia Shanghai Bell discussion Rel-18 NR\_QoE\_enh-Core

[R2-2305767](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2305767.zip) Open issues to support QoE collection in NR-DC Qualcomm Incorporated discussion NR\_QoE\_enh-Core

[R2-2306108](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2306108.zip) Considerations on QoE measurement for NR-DC ZTE Corporation, Sanechips discussion Rel-18 NR\_QoE\_enh-Core

[R2-2306398](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_122/Docs/R2-2306398.zip) Discussion on support of QoE measurement for NR-DC CATT discussion Rel-18 NR\_QoE\_enh-Core

### 7.14.5 Other topics

Including discussion on the continuity of legacy QoE measurement job for streaming and MTSI service during intra-5GC inter-RAT handover process.

Including any other QoE enhancement discussion (e.g. service type aspects).

This agenda item is not treated in this meeting (except for LSs received from other WGs).

## 7.17 Dual Transmission/Reception (Tx/Rx) Multi-SIM for NR

(NR\_DualTxRx\_MUSIM-Core; leading WG: RAN2; REL-18; WID: [RP-230751](https://www.3gpp.org/ftp/TSG_RAN/TSG_RAN/TSGR_99/Docs/RP-230751.zip))

Time budget: 0 TU

Tdoc Limitation: 0 tdocs

This topic is not planned to be treated in this meeting (except for urgent LSs received from other WGs).

# Summary

**Comebacks:**

**Agreed documents ()**

*4.1: LTE legacy ()*

**Endorsed (4)**

*7.5: Rel-18 XR enhancements ()*

*7.14: Rel-18 QoE enhancements ()*

**Approved LS out (2)**

*7.5: Rel-18 XR enhancements ()*

*7.14: Rel-18 QoE enhancements ()*

**Post-meeting email discussions (short, CR/LS finalization) ()**

**Post-meeting email discussions (long, from RAN2#121bis) ()**

**Post-meeting email discussions (long, from RAN2#121bis) (2)**

* [Post122][232][MUSIM] Running Stage-2 CR for NR MUSIM enhancements (vivo)

 Scope: Update running Stage-2 CR based on agreements in this meeting for NR Rel-18 MUSIM

 Intended outcome: Endorsed running CR

 Deadline: Long

* [Post122][233][MUSIM] Running RRC CR for NR MUSIM enhancements (NN)

 Scope: Update running RRC CR based on agreements in this meeting for NR Rel-18 MUSIM

 Intended outcome: Endorsed running CR

 Deadline: Long