3GPP TSG-RAN WG2 Meeting #120 Toulouse, France R2-22xxxxxx

Online, November, 2022

**Agenda item: 10.2**

**Source: Vice Chairman (Nokia)**

**Title: Report on XR**

**Document for: Approval**

# Organizational

Not Treated Agenda Items

- The current agenda has a number of items marked tdoc limitation: 0 and Not treated. Such Agenda items may have LS ins, and they are also not expected to be treated, but exceptions could be considered if needed.

Tdoc limitations (reminder)

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

- Assigned Editor of Running CRs input to update the running CR and input of one tdoc to facilitate addressing of CR open issues.

- 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).

Tdoc limitations applies to all other submitted tdocs.

Rel-17 CR

General, all correction CRs / draft CRs:

1. Rapporteurs of Rel-17 WI CRs are asked to continue their volunteer responsibility.

2. Unless otherwise explicitly agreed/indicated, max one Cat F CR per TS per WI shall be produced as outcome of the meeting. Exception: NBC aspects, if any, may need to be in a separate CR per WI (decided case by case). Note that Impact analysis is required per CR.

3. No editorial corrections for this meeting

Rel-17 UE capabilities

For NR UE capabilities the following applies:

1: As previously, work on mega CRs (one mega CR for TS 38.306 and one for TS 38.331). This work is done under Agenda Item AI 6.0.2

2: Coordinate centrally incorporation in CRs of RAN1 / RAN4 features for all Rel17 WIs. This work is done under Agenda Item AI 6.0.2 and changes are done directly to the mega CRs. There could be exceptions, case by case, where RAN1 / RAN4 features are treated under a WI-specific Agenda Item instead.

3 At the end of R2 119bis-e, endorsed WI specific UE capability CRs will be merged into the mega CRs, and the mega CRs will be provided to TSG RAN. Any exception to this need to be decided case by case.

**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 (for Thu/Fri comebacks)**

* **Comment deadline:** Wednesday, 1600 local time (for collecting views)
* **Rapporteur proposals:** Thursday, 1100 local time (proposed outcome)
* **Document deadline:** 1h before session (discussion report)

**Organizational**

* [AT120][200] Organizational – LTE legacy, 71 GHz, DCCA, Multi-SIM, RAN slicing, QoE and XR (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 (for LS discussion):

* + - General information sharing about the sessions

**Post-meeting email discussions**

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

**Dates and deadlines (see also RP-221818) – Technical Meeting**

Nov 4th, 0900 UTC **General Tdoc Submission Deadline**.

Nov 9th Topic/Agenda item Summaries: Deadline for making available by the reflector:

Nov 21-25 **Inactive period**

Dec 2nd **Deadline Short Post120 email discussions**. Short Post email discussions can be started before the meeting has ended.

**Meeting Schedule (November 14-18)**

Web conference scheduled for the duration of the meeting following the local time zone.

NOTE that this schedule may be modified on short notice.
THE Schedule for CBs on Thursday (and Friday) will be updated on Wednesday, and the schedule for CBs on Friday may be further updated on Thursday.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Main room** | **Breakout room 1** | **Breakout room 2** | **Breakout room 3** |
| **Monday** |  |  |  |  |
| 09:00 – 10:30 | [1], [2], [3]NR1516 CP (Johan) | Breakout to start after NR common items in the main room:NR151617 UP (Diana)NR17 - SDT - IIOT URLLC - RACH (Diana) | Breakout to start after formal opening of meeting in main room:NR1516 (Kyeongin)NR17 (Kyeongin).  |  |
| 11:00 – 13:00 |
| 14:00 – 16:00 | NR1516 CP (Johan) | NR18 MT-SDT [0.5] (Diana)NR18 UAV [0.5] (Diana) | NR17 (Kyeongin).NR18 SL evolution [0.5] (Kyeongin) |
| 16:30 – 18:30 | NR17 (Johan)- feMIMO- Other- Common CP- MGE, NPN, UDC | NR18 Network Energy Saving [1] (Diana) | NRLTE1516 (Nathan)NR17 (Nathan)- NR Pos |
| **Tuesday** |  |  |  |  |
| 08:30 – 10:30 | NR17 (Johan)- eIAB- ePowSav- TEI17 | EUTRA16+ (Tero)- 4.4: CSI subframe sets ([R2-2211108](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2211108.zip), [R2-2212602](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2212602.zip), [R2-2212219](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2212219.zip)), UAV ([R2-2211187](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2211187.zip)), PDCP ([R2-2211386](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2211386.zip), [R2-2212763](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2212763.zip), [R2-2212766](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2212766.zip))- 7.1: NPUSCH 16QAM ([R2-2212961](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2212961.zip)), LTE relay Stage-2 ([R2-2211364](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2211364.zip)), ue-ConfigRelease in HO request ([R2-2211751](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2211751.zip))NR17 DCCA (Tero)- 6.2.1: CHO with SN ([R2-2211791](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2211791.zip), [R2-2212255](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2212255.zip))- 6.2.2: Measurements for conditional reconfigs ([R2-2212460](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2212460.zip), [R2-2211760](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2211760.zip)), SCG deactivation corrections ([R2-2211965](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2211965.zip), [R2-2212854](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2212854.zip)) | NR17 (Nathan) - NR pos- SL relay |  |
| 11:00 – 13:00 | NR18 Other [0.5] (Johan)NR18 Mobile IAB [0.5] (Johan) | NR17 MUSIM (Tero)- 6.3: NAS busy indication ([R2-2211119](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2211119.zip), [R2-2211246](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2211246.zip)), UAI and aperiodic gaps ([R2-2211357](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2211357.zip)), MUSIM and re-establishment ([R2-2211770](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2211770.zip)), miscellaneous corrections ([R2-2212111](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2212111.zip), [R2-2212746](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2212746.zip))IF time allows:- 6.3: Editorial corrections ([R2-2211801](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2211801.zip), [R2-2212745](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2212745.zip), [R2-2211356](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2211356.zip))NR17 71 GHz (Tero)- 6.20.1: TCI state for RSSI ([R2-2211148](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2211148.zip), [R2-2211705](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2211705.zip)), multi-PDSCH scheduling ([R2-2211149](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2211149.zip), [R2-2211533](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2211533.zip)), CCA config ([R2-2211158](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2211158.zip), [R2-2211170](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2211170.zip), [R2-2211941](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2211941.zip)), miscellaneous corrections ([R2-2211991](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2211991.zip), [R2-2211505](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2211505.zip)) | NR18 Pos [2] (Nathan) |
| 14:00 – 16:00 | NR18 feMob [2] (Johan)- LTM | NR17 Slicing (Tero)- 6.8: Slice-based RACH ([R2-2212696](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2212696.zip)), SIB16 and slice-specific reselection priorities ([R2-2212568](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2212568.zip)), slice-based reselection ([R2-2211962](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2211962.zip), [R2-2211963](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2211963.zip), [R2-2212152](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2212152.zip), [R2-2212210](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2212210.zip), [R2-2212316](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2212316.zip), [R2-2212914](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2212914.zip))NR17 QoE (Tero)- 6.14: Buffer level measurements ([R2-2212218](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2212218.zip), [R2-2212464](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2212464.zip)), PDU session ID signalling ([R2-2212463](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2212463.zip)), clarifying SRB4 config ([R2-2211547](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2211547.zip))NR18 eQoE [0.5] (Tero)- 8.14.2: QoE configuration ([R2-2212938](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2212938.zip), [R2-2212635](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2212635.zip), [R2-2212795](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2212795.zip), [R2-2211800](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2211800.zip))- 8.14.4: Bearer handling ([R2-2211451](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2211451.zip), [R2-2212940](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2212940.zip)) | NR18 Pos [2] (Nathan) |
| 16:30 – 18:30 | NR18 feMob [2] (Johan) | NR18 XR [2] (Tero)- 8.5.1 : Work plan ([R2-2211595](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2211595.zip)), SA2 status ([R2-2211596](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2211596.zip)), TR update ([R2-2212908](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2212908.zip)), SA2 LS on XR ([R2-2211138](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2211138.zip), [R2-2211490](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2211490.zip), [R2-2212189](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2212189.zip))- 8.5.2.1 : LCH mapping ([R2-2212471](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2212471.zip), [R2-2212534](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2212534.zip)), UL PDU set information ([R2-2211177](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2211177.zip)), PDU set-based QoS ([R2-2211718](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2211718.zip))- 8.5.2.2 : Delay-awareness in LCP ([R2-2211598](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2211598.zip), [R2-2212190](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2212190.zip), [R2-2211178](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2211178.zip))- 8.5.2.3 : PDU discard in lower layers ([R2-2211993](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2211993.zip)), PDU discard mechanism ([R2-2212129](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2212129.zip)), PDU discard usage ([R2-2212331](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2212331.zip)) IF time allows:- 8.5.4.2 : CG enhancements ([R2-2212890](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2212890.zip)) | NR17 (Nathan) - SL relayNR18 SL relay [1.5] (Nathan) |
| **Wednesday** |  |  |  |  |
| 08:30 – 10:30 | NR18 NCR [0.5] (Sasha)NR17 MBS (Dawid) | R17 Maint (Sergio)- Iot NTN- NR NTN | NR18 IDC [1] (Yi) |  |
| 11:00 – 13:00 | NR17 MBS continuation, if needed (Dawid)NR 18 MBS [0.5] (Dawid) | R17 Maint (Sergio)- RedCap- Cov Enh | NR17 SONMDT (HuNan) |
| 14:00 – 16:00 | NR18 XR [2] (Tero)- 8.5.4.2 : CG enhancements ([R2-2212890](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2212890.zip)), UL assistance ([R2-2212936](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2212936.zip)), PDU set retransmissions or PDU concatenation ([R2-2211601](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2211601.zip))- 8.5.4.1: BSR table and other BSR details ([R2-2211600](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2211600.zip), [R2-2212517](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2212517.zip))- 8.5.3.2: UE assistance info for power saving ([R2-2211495](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2211495.zip), [R2-2212632](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2212632.zip))- 8.5.3.1: DRX usage ([R2-2211180](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2211180.zip), [R2-2211775](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2211775.zip)), SFN wrap-around ([R2-2212886](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2212886.zip), [R2-2211860](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2211860.zip)) | L18 IoT-NTN [1] (Sergio) | NR18 SONMDT [1] (HuNan) |
| 16:30 – 18:30 | NR18 AIML [1] (Johan) | NR18 NTN enh [1] (Sergio) | NR18 SL relay [1.5] (Nathan) |
| **Thursday** |  |  |  |  |
| 08:30 – 10:30 | CB NR1516 (Johan)CB NR 17 (Johan)- feMIMO- Other | CB Diana | CB Kyeongin |  |
| 11:00 – 13:00 | CB NR17 Johan)- MGE, NPN, UDC | CB Diana | CB Kyeongin |
| 14:00 – 16:00 | CB NR17 (Johan)- continuation if neededCB NR18 (Johan)- Other, Mob | CB EUTRA16+, NR17 Tero (TBD, exact schedule announced on Wednesday) | CB Nathan |
| 16:30 – 18:30 | CB NR18 (Johan)- Other, Mob IAB | CB NR17, NR18 Tero (TBD, exact schedule announced on Wednesday)- XR CB session | CB Nathan |
| **Friday** |  |  |  |  |
| 08:30 – 10:30 | CB Dawid TBD | If needed: 07:30-08:30 CB DianaR17 Maint (Sergio) - remaining NTN things- CBs | CB Nathan, Kyeongin  |  |
| 11:00 – 13:00 | CB NR18 NCR (Sasha)CB NR17, NR18 (Johan) | CB Sergio | CB YiCB HuNan |
| 14:00 – 16:00 | CB NR17, NR18 (Johan)  | CB Sergio, CB Tero TBD | CB HuNan |
| 16:00 – 17:00 | Comebacks CP, (Johan) |  |  |  |

**Breaks**

Morning coffee: 10:30 to 11:00

Lunch: 13:00 to 14:00

Afternoon coffee: 16:00 to 16:30

# 8 Rel-18

## 8.5 XR Enhancements for NR

(FS\_NR\_XR\_enh; leading WG: RAN2; REL-18; WID: RP-220285)

Time budget: 2 TU

Tdoc Limitation: 7 Tdocs

### 8.5.1 Organizational

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

Online 1(Tuesday) (1)

Work plan:

[R2-2211595](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2211595.zip) Work Plan for Rel-18 SI on XR Enhancements for NR Nokia, Qualcomm (Rapporteurs) Work Plan Rel-18 FS\_NR\_XR\_enh

- Ericsson: most promising solution should be solutions for which we have gains shown.

- Vodafone: if we extend the study it should be to conclude on issues we have identified, not to study new things.

Online 1(Tuesday) (1)

Update on SA2 work status:

[R2-2211596](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2211596.zip) SA2 Status for XR Nokia, Qualcomm (Rapporteurs) discussion Rel-18 FS\_NR\_XR\_enh

*The following conclusions from the SA2 SI are of interest to the RAN:*

*- PDU Set QoS parameters (provided via control plane):*

 *- PDU Set Error Rate (PSER);*

 *- PDU Set Delay Budget (PSDB);*

 *- PDU Set Integrated Indication (PSII) i.e. whether all PDUs are needed for the usage of PDU Set by application layer.*

*- PDU Set related assistance information (provided via control plane):*

 *- PDU Set QoS parameters (see above);*

 *- Burst periodicity.*

*- PDU Set information (provided by user plane and optionality of each information is FFS):*

 *- PDU Set Identifier;*

 *- Start PDU and End PDU of the PDU Set;*

 *- PDU SN within a PDU Set;*

 *- PDU Set Size;*

 *- PDU Set Importance;*

 *- End of Data Burst indication.*

*- RAN performs PDU Set based QoS handling based on received PDU Set QoS Parameters via control plane, and PDU Set Information received via user plane.*

*- Information provided to the RAN at PDU session establishment/modification:*

 *- Periodicity for UL and DL traffic of the QoS Flow.*

 *- In addition to integer periodicity values, non-integer values associated to, e.g., 45FPS, 60 FPS, 90FPS, 120FPS, shall be supported. Such information shall be exchanged by re-using/extending the TSCAI/TSCAC definitions in TS 23.501 clause 5.27.2.1*

 *- Traffic jitter information associated with each periodicity.*

CATT & Intel: the burst periodicity should be provided per QoS flow

Huawei: dynamic part is not going to be provided by CN, text needs to be updated

Intel: we need to discuss the uplink

LGE: wonders which part of the information is provided with every PDU

Chairman: all user plane information is carried in GTP-header

Lenovo: Stage 3 details whether all will be carried in GTP-header (for instance whether PDU Set size is carried always is FFS).

Intel: would like to have references to conclusion section of the SA2 TR

* Check offline SA2 status
* Take into account when updating the TR after this meeting

Online 1(Tuesday) (1)

Latest draft TR:

[R2-2212908](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2212908.zip) TR 38.835 v031 Nokia (Rapporteur) draft TR Rel-18 38.835 0.3.1 FS\_NR\_XR\_enh

* Agreed as baseline.

Online 1(Tuesday) (3)

[R2-2211138](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2211138.zip) LS on XR and Media Services (S2-2209979; contact: vivo) SA2 LS in Rel-18 FS\_XRM, FS\_NR\_XR\_enh To:RAN1, RAN2, RAN3

*- In KI#3 (Network exposure), SA2 has been studying what information is useful for the purpose of enablement of rate adaptation at application and how that can be exposed by 5GS to the server and agreed the conclusions in TR 23.700-60 clause 8 (see pCR S2-2209977 and S2-2209978). The purpose of rate adaptation is to reduce the influx of data to keep the buffer/queue length level low which gives low latency.*

*Two variants of L4S marking are considered: (1) L4S marking in the NG-RAN node and (2) L4S marking by the PSA UPF based on information provided by NG-RAN. SA2 would like to ask RAN2 and RAN3 feedback on the following questions:*

* Q1: whether it is feasible for RAN to estimate congestion information per QoS flow, per DRB in downlink and uplink directions.*

* Q2: whether it is feasible for RAN to estimate congestion information per QoS flow in UL, per DRB in UL without UE impacts.*

Chairman: we could leave it up to RAN3 to answer

Vivo & Xiaomi: there are RAN2 specifics aspects to handle (DRB, UE impacts)

Vodafone: should be handled in RAN3 to avoid sending conflicting messages

ZTE: RAN3 can handle DL for sure, maybe RAN2 could focus in RAN2.

Intel: We should discuss both.

[R2-2211490](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2211490.zip) Reply LS to SA2 on XR vivo LS out Rel-18 FS\_NR\_XR\_enh To:SA2 Cc:RAN1, RAN4

[R2-2212189](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2212189.zip) Discussion on network exposure of congestion level of RAN node Huawei, HiSilicon discussion Rel-18 FS\_NR\_XR\_enh

*Observation: All the relevant element which may affect RAN congestion can be well perceived by the RAN node.*

*Proposal 1: Reply to SA2 that it is feasible for RAN to estimate congestion information per QoS flow and per DRB in downlink and uplink directions.*

*Proposal 2: Reply to SA2 that it is feasible for RAN to estimate congestion information per QoS flow and per DRB in uplink without UE impacts.*

Qualcomm: we need to understand what congestion means.

Vivo: we agree with Qualcomm. We believe it’s related to latency.

Huawei & Vodafone: well-defined concept.

Vodafone: what matters is how latency requirement is met, there are many tools for that.

Ericsson & Nokia: agree that we have enough mechanisms.

* Vivo and Huawei to reply to SA2 that we have enough tools available to assess congestion.
* [AT120][299][XR] Reply LS to SA2 on Congestion (Huawei, Vivo)

 Scope: reply to SA2 that RAN2 has enough tools available to assess congestion.

 Intended outcome: LS in R2-2212989 (updated of R2-2211490)

 Deadline: Deadline Thursday 17th.

### 8.5.2 XR-awareness

No documents should be submitted to 8.5.2. Please submit to 8.5.2.x

Contributions should take the existing SA2/SA4 decisions into account.

#### 8.5.2.1 PDU sets and data bursts

Including discussion on how PDU sets can be mapped to DRBs and how the LCH configuration works.

Including discussion on “traffic flow without PDU set” and how does that fit in with XR traffic awareness (e.g. is it only pose control)?

Online 1(Tuesday) (3-4)

[R2-2212471](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2212471.zip) Discussion on PDU sets and data bursts InterDigital, Inc. discussion Rel-18 FS\_NR\_XR\_enh

* Focus on P5

*Awareness of PDU set characteristics*

*Proposal 1: Support awareness of PDU set types (e.g., type 1 or type 2) at UE and RAN.*

*Proposal 2: Support awareness of importance of PDU sets at UE and RAN.*

*Mapping of PDU sets to DRBs*

*Proposal 3: SDAP maps PDU sets to one or multiple DRBs based on new mapping rules (e.g., based on importance of PDU sets).*

*Proposal 4: DRBs are configured for meeting PDU-set-level QoS (e.g., PSDB, PSER).*

*LCH options for handling PDU sets*

*Observation 1: Depending on how PDU sets are mapped to QoS flows at the higher layers and the respective PDU set-level QoS, different alternatives for the L2 structures can coexist at the AS layers.*

*Proposal 5: There are two options for mapping the PDU sets in DRBs to LCHs:*

* Option 1: 1-to-1 mapping (e.g., PDCP maps PDU sets to one LCH)*

* Option 2: 1-to-M mapping (e.g., PDCP maps PDU sets to M LCHs)*

*RAN2 supports both options 1 and 2.*



*Reordering and in-order delivery*

*Proposal 6: RAN2 to send LS to SA4/SA2 to clarify whether in-order delivery of PDU sets is needed during transmissions in DL and UL.*

Ericsson: disagree with the proposal, no gains shown. 111 is the only reasonable option.

Samsung: would like to have option 2.

Apple: this would be needed when several QoS flows are muxed on the same DRB.

ZTE: if we have many DRBs as QoS flows we can have 111, if more, not. In-order delivery also needs to be considered.

Chairman: technical reasons to have DRB limit of 16 would equally apply to any subchannels.

Ericsson: agree

CATT: apply should equally apply in DL & UL. In UL, subchannels would be difficult to handle in LCP (PBR setting). Video stream has a PBR of its own, not IPB frames separately.

Vivo: would like to map PDUs of PDU sets to different LCH

Vodafone: 111 is legacy so no question it works. Wonders how many PDU sets we will have.

Qualcomm: differentiated handling can only be handled with Option 2.

Huawei & Lenovo: we need differentiated handling. Reordering also needs to be handled.

Lenovo: we agree with Qualcomm.

Oppo: wonders how PDCP can route the PDU sets.

CATT: 111 still allows differentiated handling (for free in DL, with minor enhancements to LCP in UL).

Mediatek: seems that PSER was only given as reason but PSER is static so do not see a reason to change

Intel: re-ordering is main issue.

Google: PSER can be per importance.

* N1N excluded
* Splitting DRB into multiple LCH (DC like) FFS.
* Should try to understand why we would need to treat PDU sets differently over the radio and why different PDU sets are muxed over same flows. Also need to understand need for reordering.
* Send LS to SA2/SA4 (Nokia)
* [AT120][298][XR] LS to SA2 on PDU Set Handling (Nokia)

 Scope: send an LS to SA2 to understand why we would need to treat PDU sets differently over the radio and why different PDU sets are muxed over same flows. Also need to understand need for reordering.

 Intended outcome: LS in R2-2212993

 Deadline: Deadline Thursday 17th.

[R2-2212534](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2212534.zip) Discussion on PDU Set for XR-awareness NEC Corporation discussion Rel-18 FS\_NR\_XR\_enh

* Focus on P1-5

*Observation 1: For supporting QoS handing of alternative N1N, SDAP shall support mapping a single QoS flow A to multiple DRBs.*

*Observation 2: With SA2 concluded PDU set related parameter/information provided by the CN, it is feasible to enhance SDAP layer to support mapping a single QoS flow A to multiple DRBs.*

*Proposal 1: RAN2 to assume the option 1 of DRB(s)/ LCH(s) mapping for alternatives NN1 and N11 to ensure PDU set based QoS handling.*

*Proposal 2: If Proposal 1 can be agreed, capture Figure 3 and Table 1 to TR38.835.*

*Proposal 3: RAN2 to agree to work further on alternative 111 (if SA2 agrees to introduce sub-Qos flow) and alternative N1N (with current QoS flow definition) during normative phase.*

*Proposal 4: RAN2 to discuss how the intra-PDU Set information is conveyed in the PDCP header.*

*Proposal 5: RAN2 not to discuss inter-PDU Set handling.*

*Proposal 6: During handover, PDU Set information can be considered to be forwarded from source gNB to target gNB.*



[R2-2211177](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2211177.zip) Discussions on PDU Sets Qualcomm Incorporated discussion Rel-18 FS\_NR\_XR\_enh

* Focus on P1-5

*Mapping PDU Sets with different importance*

*Observation 1. The intention of supporting different PDU Set Importance levels is to enable differentiated handling for different types of PDU Sets.*

*Observation 2. A fundamental principle in the 5G QoS framework is that all user-plane traffic within a QoS flow should receive the same forwarding treatment.*

*L4S marking*

*Observation 3. As the purpose of L4S marking is to inform a XR application of QoS degradation in its network path, criteria used by RAN to estimate congestion can include at least delay, jitter and/or error rate cross Uu interface.*

*Observation 4. On DL, RAN is able to (approximately) estimate delay, jitter and error rate of PDUs per QoS flow in an AM DRB without UE impact. But not so for an UM DRB.*

*Observation 5. On UL, RAN is not able to estimate delay or jitter of a QoS flow or DRB without UE assistance. However, RAN is able to estimate error rate without any UE impact.*

*Delivery deadline vs delay budget*

*Observation 6. If RAN has the knowledge of delivery deadlines of downlink traffic or nominal arrival times of uplink traffic, it can have more delay budget in its scheduling and hence achieve higher system capacity and enable more UE power savings.*

*Observation 7. It is simpler to have UE than 5GC provide delivery deadlines and nominal arrival times to RAN.*

*Observation 8. Delivery deadlines can also simplify RAN’s handling of multi-modal traffic.*

*UL PDU Set*

*Proposal 1. UE identifies and marks UL PDU Sets by either UE implementation or matching RTP/SRTP header and payload (i.e. the same method used by UPF for DL PDU Sets).*

*Proposal 2. UE provides the following information on UL PDU Sets to RAN via user plane:*

*• PDU Set identifier (e.g. sequence number)*

*• Boundary indication of an UL PDU set (e.g. start and end of a PDU Set)*

*• (optional) PDU Set size in bytes or number of PDUs in PDU Set*

*• (optional) End of Data Burst indication in the header of the last PDU of a Data Burst*

*• FFS PDU Set Importance*

*Mapping PDU Sets with different importance*

*Proposal 3. UL PDU Sets with different importance are mapped to different QoS flows, which have separate QoS profiles to support differentiated handling of different importance.*

*Proposal 4. If in-order delivery is required, PDU Sets with different importance but associated with the same traffic flow can share the same sequence number space for PDU Sets and be mapped to the same DRB. Otherwise, how to map QoS flows and DRBs is up to network configuration (i.e. either Alternative 111 or Alternative NN1).*

*Proposal 5. Alternative N11 and Alternative N1N are not supported.*

*L4S marking*

*Proposal 6. Reply to SA2 with Observation 4 and 5.*

*Proposal 7. Whether/when/how UE performs ECN or L4S marking is up to UE implementation. No spec changes are needed.*

*Proposal 8. UE reporting congestion level to RAN for the purpose of ECN/L4S marking is not supported.*

*Signaling DL PDU Set Information*

*Proposal 9. DL PDU Set information is also signalled over Uu interface. It includes at least fields that help identify the association between a PDU and a PDU Set, e.g. sequence number, boundary indication, and (optional) size of a PDU Set, etc.*

*Proposal 10. PDU set information is sent in band in PDCP header of each PDU in a PDU set. It is not ciphered and not included in integrity protection.*

*Delivery deadline vs delay budget*

*Proposal 11. RAN uses delivery deadlines (for downlink) and nominal arrival times (for uplink) instead of configured deadlines (i.e. actual arrival time + a fixed delay budget) in its scheduling of PDUs and PDU sets.*

*Proposal 1. UE identifies and marks UL PDU Sets by either UE implementation or matching RTP/SRTP header and payload (i.e. the same method used by UPF for DL PDU Sets).*

LGE: Stage 3 details?

Xiaomi: agree with P1

Intel: can be left to SA2

Mediatek: marking of PDU sets should only be introduced if needed by gNB.

Huawei: wonders how the gNB would use the information?

Ericsson: BSR should be enough.

Nokia: PDU marking not needed.

CATT: agree with Mediatek.

Vodafone: would like to understand why need for identification then?

Chairman: to route the sets on the right LCH

Qualcomm: in-band marking needed for discard

HW: makes no difference once transmitted.

ZTE: some semi-static information would be useful to handle discard.

**For Uplink**

* Agree that UE identifies PDU Sets / Bursts.
* In-band marking not needed. Further information considered if BSR is not enough.
* Handling of discard FFS.
* Mention agreements in SA2 LS (see email discussion 298)

[R2-2211718](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2211718.zip) PDU Set based QoS Apple discussion FS\_NR\_XR\_enh

* Focus on P3, P6

*Proposal 1: RAN2 should rely on the existing QoS model for as much as possible. A one to one mapping of PDU Sets to QoS flows to DRBs is the most preferred approach.*

*Proposal 2: When PDU Sets are mapped to the same DRB, PDU Set integrated packet handling and differentiated QoS treatment of PDU Sets can be achieved by mapping PDU Sets with different QoS characteristics to different logical channels / RLC entities.*

*Proposal 3: Types of PDU Sets associated with different QoS characteristics may be mapped to different DRBs. In-ordering delivery can be maintained in higher layers. When XR traffic flows require in-order delivery in AS, different types of PDU Sets may be mapped to the same DRB.*

*Proposal 4: The exact location (layer) of new packet headers can be defined based on SA2 progress.*

*Proposal 5: “Traffic flows not based on PDU Sets” should be characterized based on their contextual relation to other XR traffic flows and PDU Sets to be treated.*

*Proposal 6: “Traffic flows not based on PDU Sets” can be treated in two ways on a QoS flow, DRB or LCH:*

*a) In traditional per-packet fashion (when its PDUs are independent of other XR traffic flows); or*

*b) As PDU Set with “number of packets = 1” (when its PDUs are closely related to other XR traffic flows) e.g. to keep them in the framework for XR traffic.*

[R2-2212852](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2212852.zip) Discussion on XR awareness and PDU Set LG Electronics Inc. discussion Rel-18 FS\_NR\_XR\_enh

*Observation 1. Alternative 111 (model 1a) may suffer from shortage of DRBs when the number of XR services increases.*

*Observation 2. Alternative N1N (model 2b) may require unnecessary duplicated functions at the SDAP entity which needs huge spec impact.*

*Observation 3. Alternative N1N (model 2b) may suffer from shortage of DRBs when the number of XR services increases, similar to Alternative 111 (model 1a).*

*Observation 4. Splitting PDUs to different RLC entities at PDCP is a feasible option to support QoS handling per PDU Set within a single DRB. The required change like enhancement for packet inspection seems acceptable.*

*Observation 5. Delivering PDUs to a single RLC entity at PDCP and performing QoS differentiation within the RLC entity is an option to support QoS handling per PDU Set within a single DRB. But, expected changes such as packet inspection in RLC and PDU delivery to multiple logical channels seem to have considerable spec. impact.*

*Proposal 1. Consider Alternative 111 (model 1a) as baseline, and allow other Alternatives to resolve DRB shortage problem.*

*Proposal 2. Alternative N1N (model 2b) is not supported.*

*Proposal 3. Whether to support Alternative NN1 (model 1b), or Alternative N11 (model 2a), or both is decided by SA2.*

*Proposal 4. If SA2 decides that different PDU Sets can be multiplexed onto a single DRB, RAN2 should consider QoS handling per type of PDU Set within a single DRB.*

*Proposal 5. Allow a PDCP entity to split PDUs to different RLC entities according to types of PDU sets for supporting QoS handling per PDU Set within a single DRB if Alternative NN1 (model 1b) or Alternative N11 (model 2a) is supported.*

[R2-2212188](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2212188.zip) Further discussion on PDU set handling Huawei, HiSilicon discussion Rel-18 FS\_NR\_XR\_enh

*Mapping between DRBs and LCHs*

*Observation 1: For Model 1b and 2a, an additional effort is required to identify and specify a way to map PDU sets with different importance onto the separate LCHs.*

*Observation 2: For Model 2b, an additional effort is required to identify and specify a way to map PDU sets contained in a single QoS flow to different DRBs.*

*Observation 3: Model 1a has least impacts onto RAN2 protocol stack and is preferred provided that AS reordering is not required between data belonging to PDU sets mapped to different DRBs.*

*Handling of traffic flow without PDU set*

*Observation 4: The assistance information agreed by SA2 is not limited to traffic based on PDU sets, e.g. periodicity.*

*Mapping between DRBs and LCHs*

*Proposal 1: In order to enable differentiated PDU set handling at RAN, it should be possible to map PDU sets with different importance to different logical channels.*

*Proposal 2: Before selecting a protocol stack for handling PDU sets with different importance, RAN2 should check with SA2/SA4 whether AS reordering needs to be supported for XR traffic.*

*Proposal 3: If AS reordering is needed for an XR traffic, the legacy PDCP reordering function is reused, i.e. no new reordering function will be defined in other AS layers, e.g. SDAP.*

*Proposal 4: Alternative 1a is selected in case XR service does not require AS reordering.*

*Proposal 5: If single DRB is used, i.e. alternative 1b and 2a, PDCP layer shall be able to map PDU sets with different importance levels to different logical channels.*

*Proposal 6: The same RAN protocol design should be used to handle both DL and UL differentiated PDU set handling.*

*Proposal 7: It can be up to UE implementation how to identify the packets belonging to the same PDU set, as well as the importance information for each PDU set.*

*Handling of traffic flow without PDU set*

*Proposal 8: For non-PDU set based traffic flows, the assistance information agreed by SA2 (e.g. periodicity) should also be available and no special treatment is required.*

Question: delay in LCP?

Ericsson & ZTE: agree it’s not needed.

Lenovo: needed to ensure delay requirements are met.

CATT: not convinced this is needed and wonder how it would work with non-delay sensitive.

Mediatek: not convinced this is required.

Samsung: want to consider remaining delivery time.

* If delay-aware LCP is introduced, need the ability to turn it off.
* SRBs not impacted.
* Not considered further unless fundamental issues are identified.

[R2-2212329](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2212329.zip) Discussion on PDU Sets and Data Bursts for XR Google Inc. discussion

[R2-2212704](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2212704.zip) Considerations on PDU sets and Data bursts in RAN CMCC discussion Rel-18 FS\_NR\_XR\_enh

[R2-2211995](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2211995.zip) Discussion on PDU sets mapping model NTT DOCOMO, INC. discussion Rel-18

[R2-2212608](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2212608.zip) Discussion on Uplink XR-Awareness for XR services Meta USA discussion Rel-18

[R2-2211436](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2211436.zip) XR awareness for PDU sets and bursts CATT discussion Rel-18 FS\_NR\_XR\_enh

[R2-2212649](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2212649.zip) Discussion on PDU set to DRB mapping Samsung discussion Rel-18 FS\_NR\_XR\_enh

[R2-2212889](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2212889.zip) Discussion on PDU Sets and Data Burst Ericsson discussion Rel-18 FS\_NR\_XR\_enh

[R2-2211597](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2211597.zip) Mapping of PDU Set, QoS Flow and DRB Nokia, Nokia Shanghai Bell discussion Rel-18 FS\_NR\_XR\_enh

[R2-2211437](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2211437.zip) On the PDU set mapping options CATT discussion FS\_NR\_XR\_enh

[R2-2211524](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2211524.zip) PDU set to DRB mapping for XR ZTE Corporation, Sanechips discussion

[R2-2211378](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2211378.zip) DRB mapping for XR specific requirement Intel Corporation discussion Rel-18 FS\_NR\_XR\_enh

[R2-2211491](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2211491.zip) Discussion on XR awareness and per-QoS flow/DRB congestion vivo discussion Rel-18 FS\_NR\_XR\_enh

[R2-2211584](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2211584.zip) Discussion on QoS support with PDU Set granularity Xiaomi Communications discussion

[R2-2211848](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2211848.zip) Discussions on L2 structure of XR Fujitsu discussion Rel-18 FS\_NR\_XR\_enh

[R2-2211957](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2211957.zip) Discussion on PDU Set awareness OPPO discussion Rel-18 FS\_NR\_XR\_enh

[R2-2212039](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2212039.zip) Discussion on PDU sets and data burst awareness in RAN Lenovo discussion Rel-18

[R2-2212163](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2212163.zip) Discussion on PDU sets and data bursts Spreadtrum Communications discussion Rel-18

[R2-2212695](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2212695.zip) Discussion on PDU set mapping for XR-awareness III discussion FS\_NR\_XR\_enh

*Withdrawn:*

[R2-2211829](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2211829.zip) Discussions on L2 structure of XR Fujitsu discussion Rel-18 FS\_NR\_XR\_enh Withdrawn

#### 8.5.2.2 PDU prioritization

Including discussion on whether PDU prioritization is needed for XR traffic, and how should it work, e.g. whether there are impacts to LCP mechanism, how does the PDU set importance work, etc.

Online 2 (Tuesday) (3)

[R2-2211598](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2211598.zip) LCP Impacts for XR Nokia, Nokia Shanghai Bell discussion Rel-18 FS\_NR\_XR\_enh

*Proposal 1: LCP does not need to be enhanced to deal with the PDB of XR services.*

*Proposal 2: in tiled stream approach, all tiles should be carried on the same radio bearer, or at least on radio bearers ensuring a similar BLER over the air interface and there is no need to enhance LCP to deal with tiles.*

*Proposal 3: when an XR QoS flow is relocated from an old bearer to a new one, the priority of the old bearer is set equal to the priority of the new bearer for as long as the old bearer has data buffered for that QoS flow.*

[R2-2212190](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2212190.zip) Discussion about XR-awareness impacts on LCP Huawei, HiSilicon discussion Rel-18 FS\_NR\_XR\_enh

*Observation 1: In the current LCP mechanism, UE allocates resources only to the selected logical channels.*

*Observation 2: The current LCP mechanism does not consider the remaining PDB of data.*

*Observation 3: UL AR requires significant throughput with quite stringent PDB requirement.*

*Observation 4: The PDB of UL XR traffic is larger than the periodicity of UL XR traffic.*

*Observation 5: For UL AR service, different streams (e.g. I-frame stream and P-frame stream) may be mapped to different LCHs with different priority.*

*Observation 6: Since the current LCP mechanism does not consider the remaining PDB of data, when data on LCH with higher priority arrives, the UE always preferentially transmits data on LCH with higher priority, which may result in the UE being unable to transmit data on LCH with lower priority within the PDB requirement.*

*Observation 7: The current LCP mechanism can ensure the transmission of more important PDU set if PDU sets with different importance are associated with different LCHs with different priority.*

*Proposal 1: In order to solve the impact of arrival of data of a high-priority logical channel on data transmission of a lower-priority logical channel, the remaining PDB of the data buffered in the LCH should be considered during LCP procedure.*

*Proposal 2: Enhance LCP in a way allowing to allocate the resources remaining after the current LCP procedure to be used for data belonging to logical channels which would not be mapped to such resources according to the current LCP mechanism.*

*Proposal 3: RAN2 to confirm that no LCP enhancement is needed to consider PDU set importance if PDU sets with different importance are mapped to LCHs with different priority.*

[R2-2211178](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2211178.zip) Discussion on PDU prioritization Qualcomm Incorporated discussion Rel-18 FS\_NR\_XR\_enh

*Prioritization among different PDU Set Importance*

*Observation 1. If in order delivery is not required, Alternative 111 can support differentiated handling of different PDU Set Importance through configuration of different QoS profiles. No additional enhancements are needed.*

*Proposal 1. If different PDU Set Importance are mapped to the same DRB, this DRB can have multiple RLC entities and logical channels, each of which is used to serve different PDU Set Importance.*

*Delay-aware LCP procedure*

*Observation 2. For bursty flows, network may have to give up some uplink capacity in exchange for their delay performance.*

*Observation 3. If the LCP procedure can take residual delay budget into account when scheduling uplink data, network can more efficiently allocate bandwidth for bursty flows and thus improve uplink capacity.*

*Proposal 2. RAN2 study enhancements to LCP procedure which take residual delay budget of buffered data into account when scheduling uplink data.*

[R2-2211379](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2211379.zip) Enhancements to provide differentiated XR handling Intel Corporation discussion Rel-18 FS\_NR\_XR\_enh

[R2-2211438](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2211438.zip) Considerations on PDU Prioritization CATT discussion Rel-18 FS\_NR\_XR\_enh

[R2-2211492](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2211492.zip) Discussion on PDU prioritization for XR awareness vivo discussion Rel-18 FS\_NR\_XR\_enh [R2-2209486](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2209486.zip)

[R2-2211526](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2211526.zip) PDU-set prioritization for XR ZTE Corporation, Sanechips discussion

[R2-2211585](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2211585.zip) Discussion on traffic prioritization of XR traffic Xiaomi Communications discussion

[R2-2211719](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2211719.zip) Enhancements for Traffic Prioritization in XR Apple discussion FS\_NR\_XR\_enh

[R2-2211923](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2211923.zip) Considerations on XR PDU prioritization Sony discussion Rel-18 FS\_NR\_XR\_enh

[R2-2211958](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2211958.zip) Discussion on PDU prioritization OPPO discussion Rel-18 FS\_NR\_XR\_enh

[R2-2212130](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2212130.zip) Discussion on PDU prioritization Lenovo discussion Rel-18 FS\_NR\_XR\_enh

[R2-2212205](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2212205.zip) Discussion on LCP impact Samsung discussion Rel-18 FS\_NR\_XR\_enh [R2-2210013](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2210013.zip)

[R2-2212330](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2212330.zip) Discussion on PDU prioritization Google Inc. discussion

[R2-2212472](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2212472.zip) Discussion on PDU prioritization InterDigital, Inc. discussion Rel-18 FS\_NR\_XR\_enh

[R2-2212703](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2212703.zip) Impact on PDU Prioritization by XR Awareness CMCC discussion Rel-18 FS\_NR\_XR\_enh

[R2-2212759](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2212759.zip) Discussion on the prioritization for XR LG Electronics Inc. discussion FS\_NR\_XR\_enh

[R2-2212888](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2212888.zip) Discussion on PDU Prioritization Ericsson discussion Rel-18 FS\_NR\_XR\_enh

[R2-2212899](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2212899.zip) On potential impacts to LCP mechanisms for XR Futurewei discussion Rel-18 FS\_NR\_XR\_enh

#### 8.5.2.3 PDU discard

Including discussion on how to handle PDU discarding of XR traffic, e.g. do we need new discard timers, how to handle PDU discard in PDCP and/or RLC, etc.

Online 2 (Tuesday) (3)

[R2-2211993](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2211993.zip) Discussion on PDU discard NTT DOCOMO, INC. discussion Rel-18

* Focus on P2

*Proposal1: RAN2 to discuss whether PDU/PDU set discard function in gNB transmitter take the same principle as UE transmitter, or PDU level discard (i.e. only discard the packets that exceed the PDB within the PDU set) could be introduced.*

*Proposal2: RAN2 to discuss whether PDU/PDU set discard function is supported at lower layers (e.g. RLC entity)*

*Proposal3: To assist PDU set discard function at lower layer (e.g. RLC entity), introduce PSDB and PDU importance level indicator in PDCP PDU header.*

*Proposal4: For PDU/PDU set discard function, in case the discarded packets have been transmitted to the lower layer, transmitter should inform receiver of the SN of discarded packeted.*

[R2-2212129](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2212129.zip) Discussion on PDU discarding Lenovo discussion Rel-18 FS\_NR\_XR\_enh

* Focus on P1

*Proposal 1: RAN2 to support timer-based discarding of PDU/SDUs of a PDU set, e.g. PDU/SDUs of a PDU set exceeding the PSDB. RAN2 to further discuss how to enforce PDU discarding on a PDU set level, e.g. UE may consider the PDCP discard timers of all the PDCP SDUs associated with an PDU set as expired for cases when the PDCP discard timer of one PDCP SDU expires.*

*Proposal 2: NW configure the legacy PDCP discard timer and PDU set integrity indication, e.g. information provided by CN, to enable the timer-based discarding of PDU/SDUs of a PDU set.*

*Proposal 3: RAN2 to discuss whether discarding of PDUs in a PDU set before expiration of the PDCP discard timer in case of UL congestion is supported.*

*Proposal 4: RAN2 to discuss enhancements to the discarding mechanism, e.g. informing receiving entity about discarded packets at the transmitter side, which may impact PDCP/RLC window operation.*

*Proposal 5: RAN2 should discuss UE reporting enhancements to inform gNB about discarded PDU/SDUs at the transmitter side, e.g. when the delay budget is exceeded for data which has been previously reported in a BSR*

[R2-2212331](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2212331.zip) Discussion on PDUs Discarding Google Inc. discussion

* Focus on P1, P4

*Proposal 1: The two options below are supported and configurable by the network:*

*• Option 1: the remainder of the PDUs in the PDU Set should be discarded in case a PDU meets the discard criteria*

*• Option 2: the remainder of the PDUs in the PDU Set are still delivered in case a PDU meets the discard criteria.*

*Proposal 2: For UE transmitter, if the UE decides to discard a PDU Set, the UE transmits to the gNB a cancellation indication to cancel the remaining CG-PUSCH resources of the PDU Set.*

*Proposal 3: UE signals to the network an indication about the discarded data, ignores a DCI scheduling a retransmission if any and requests the network to terminate the HARQ process.*

*Proposal 4: Network can request the UE to discard an UL PDU Set due to PDUs decoding failure after HARQ retransmissions.*

[R2-2211179](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2211179.zip) Discussion on PDU discard Qualcomm Incorporated discussion Rel-18 FS\_NR\_XR\_enh

[R2-2211380](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2211380.zip) Packet discard for XR traffic Intel Corporation discussion Rel-18 FS\_NR\_XR\_enh

[R2-2211439](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2211439.zip) PDU Discard of XR services CATT discussion Rel-18 FS\_NR\_XR\_enh

[R2-2211493](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2211493.zip) Discussion on PDU discard for XR awareness vivo discussion Rel-18 FS\_NR\_XR\_enh [R2-2209487](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2209487.zip)

[R2-2211525](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2211525.zip) PDU-set discard functionality for XR ZTE Corporation, Sanechips discussion

[R2-2211587](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2211587.zip) Discussing on PDU discarding of XR traffic Xiaomi Communications discussion

[R2-2211599](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2211599.zip) PDU Discard for XR Nokia, Nokia Shanghai Bell discussion Rel-18 FS\_NR\_XR\_enh

[R2-2211720](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2211720.zip) Packet Discarding and Reordering Enhancements for XR Apple discussion FS\_NR\_XR\_enh

[R2-2211859](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2211859.zip) On PSDB and PDU discard MediaTek Inc. discussion Rel-18 FS\_NR\_XR\_enh [R2-2210650](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2210650.zip)

[R2-2211924](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2211924.zip) Considerations on XR PDU discard Sony discussion Rel-18 FS\_NR\_XR\_enh

[R2-2211959](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2211959.zip) Discussion on PDU discard OPPO discussion Rel-18 FS\_NR\_XR\_enh

[R2-2212098](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2212098.zip) PDU Set and PDCP Discard Handling Samsung R&D Institute India discussion Rel-18

[R2-2212164](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2212164.zip) PDU discard of XR traffic Spreadtrum Communications discussion Rel-18

[R2-2212191](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2212191.zip) Discussion on PDU discarding for XR traffic Huawei, HiSilicon discussion Rel-18 FS\_NR\_XR\_enh

[R2-2212473](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2212473.zip) Discussion on PDU discard InterDigital, Inc. discussion Rel-18 FS\_NR\_XR\_enh

[R2-2212537](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2212537.zip) Discussion on PDU discard for XR awareness NEC Corporation discussion Rel-18 FS\_NR\_XR\_enh

[R2-2212582](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2212582.zip) Discussion on PDU Discard Meta USA discussion Rel-18

[R2-2212702](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2212702.zip) Considerations on PDU Discarding of XR Traffic CMCC discussion Rel-18 FS\_NR\_XR\_enh

[R2-2212758](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2212758.zip) Discussion on the discard and retransmission LG Electronics Inc. discussion FS\_NR\_XR\_enh

[R2-2212887](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2212887.zip) Discussion on PDU Discard Ericsson discussion Rel-18 FS\_NR\_XR\_enh

### 8.5.3 XR-specific power saving

No documents should be submitted to 8.5.3. Please submit to 8.5.3.x

#### 8.5.3.1 DRX enhancements

Including discussion on how DRX can be configured for XR, how to switch between DRX configurations and how does that impact power saving.

Including discussion on whether/what RAN2 needs for the non-integer DRX periodicity.

Including discussion on whether XR requires multiple DRX configurations active at the same time.

Online 4 (Wednesday) (3)

[R2-2211180](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2211180.zip) DRX enhancements for XR Qualcomm Incorporated discussion Rel-18 FS\_NR\_XR\_enh

* Focus on P2, P5

*Non-integer valued DRX cycles*

*Observation 1. As different options are possible to address the issue of mismatch between non-integer periodicity of XR traffic and integer valued DRX cycles, RAN2 should first agree on a set of criteria for the downselection of different options.*

*Observation 2. If DRX cycle has a non-integer value, the start time of DRX on duration can drift irregularly when when SFN wraps around (i.e. returns to 0), which can cause extra delay and higher power consumption for UE.*

*Adaptive DRX configurations*

*Observation 3. Many XR applications are capable of adapting their bit/frame rates based on the quality of their connections.*

*Observation 4. RAN/UE need to adapt UE’s DRX configuration to match application’s rate adaptation in a timely manner, to ensure consistent QoS performance.*

*Multiple DRX configurations*

*Observation 5. Traffic flows other than video have small and regular sized data and hence can be efficiently supported by SPS/CG.*

*Observation 6. It is more power efficient to use SPS/CG instead of DRX to serve traffic flows with small and regular data arrivals.*

*Observation 7. A single DRX configuration, together with multiple SPS/CG configurations or power saving features such as PDCCH skipping, is sufficient to support mixed traffic flows with different periodicities.*

*Observation 8. Enhancement for multiple independent DRX configurations has significant impact on the current DRX procedure but does not have clear power saving benefits.*

*End of burst indication for DRX*

*Observation 9. Currently it is not easy for gNB to know when a UL burst ends.*

*Observation 10. With XR traffic’s short periodicity, UE may not be able to have much sleep between two bursts if it relies on DRX inactivity timer to terminate DRX active time.*

*Observation 11. Network will be able to terminate DRX active time sooner if UE can provide indication on when a UL burst ends.*

*UL skipping and DRX/BWP inactivity timer*

*Observation 12. UL skipping or UL Tx without data is more likely to happen with XR, which causes UE to unnecessarily re-/start DRX/BWP inactivity timer and thus waste power.*

*PDCCH Skipping and DRX Enhancements*

*Observation 13. Suspending PDCCH skipping during retransmissions is useful for DG and CG.*

*Non-integer valued DRX cycles*

*Proposal 1. Based on evaluation results provided by RAN1, RAN2 apply the following criteria to down select options for supporting non-integer DRX cycles:*

*- a selected option should be able to support all currently known frame rates of XR applications;*

*- a selected option should enable the most power saving gain;*

*- a selected option should result in the least variations in the start time of DRX on durations;*

*- a selected option should have the least impact on the current DRX procedure and the current RAN1/2/4 specs.*

*Proposal 2. RAN2 study the following options to support DRX cycles with non-integer values:*

*- Option A. Add new values of DRX cycles represented in rational numbers;*

*- Option B. Use cadence instead of periodicity of DRX cycle to calculate the start time of DRX on duration.*

*Proposal 3. RAN2 study enhancements to avoid irregular start time of DRX on durations due to SFN wrap around when non-integer valued DRX cycles are configured.*

*Adaptive DRX configurations*

*Proposal 4. RAN2 study dynamic adaptation DRX configurations. FFS which DRX parameters should be included in this enhancement.*

*Multiple DRX configurations*

*Proposal 5. Study on multiple independent DRX configurations is deprioritized in R18.*

*Reduced monitoring at start of DRX on duration*

*Proposal 6. Network can configure UE to always start its DRX on durations with a set of power-optimized configurations that enable reduced PDCCH monitoring by UE. FFS which configurations should be included.*

*End of burst indication for DRX*

*Proposal 7. RAN2 study enhancements for UE to indicate either end of a UL burst or its preference to terminate DRX active time.*

*UL skipping and DRX/BWP inactivity timer*

*Proposal 8. RAN2 study whether/when UE should re-/start DRX/BWP inactivity timer when it performs UL skipping or UL Tx without data.*

*PDCCH Skipping and DRX Enhancements*

*Proposal 9. RAN2 recognizes an RRC configurable option to not allow DRX transition to active for retransmission timers or allow cancellation of PDCCH skipping only upon DRX transition to active due to duty cycle but not due to retransmissions.*

[R2-2211775](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2211775.zip) DRX enhancements for XR Nokia, Nokia Shanghai Bell discussion Rel-18 FS\_NR\_XR\_enh

* Focus on P1, P5, P7

*Proposal 1: RRC configuration is used for the UE to automatically adjust the drift every few cycles to compensate the accumulated gap due to the misalignment of XR and DRX periodicities. Details can be left to WI phase.*

*Proposal 2: adjusting of DRX cycle is beneficial to handle multi-flows as well as frame rate change for single flow without RRC reconfiguration.*

*Proposal 3: adjusting of DRX start offset could be considered as a solution to address SFN wrap around issue.*

*Proposal 4: simultaneous multiple active DRX configurations is not supported.*

*Proposal 5: the mechanism from NTN for HARQ less operation can be reused for XR to allow not starting HARQ RTT timer and retransmission timer for certain HARQ processes.*

*Proposal 6: different retransmission timer values for different UL grants or LCHs is not pursued.*

*Proposal 7: Automatic extension of active time when there is no data scheduled during the OnDuration of the DRX cycle is considered as a potential solution to address the jitter issue to allow configuration of shorter onDuration than the full jitter range.*

[R2-2212886](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2212886.zip) Discussion on DRX enhancements Ericsson discussion Rel-18 FS\_NR\_XR\_enh

* Focus on P3

*Observation 1 Depending on the network load and the traffic generation rate, different C-DRX solutions need to be applied to maximize power savings and to achieve a high fraction of satisfied UEs.*

*Observation 2 To enhance and/or configure C-DRX power saving features, the network needs per-XR flow information: - traffic periodicity and periodicity changes; - PDU Set jitter information; - delay budget or remaining PDB of the PDU Set for radio interface; - PDU Set sequence number carried in each constituent PDU; and - PDU Set size.*

*Observation 3 Matching the DRX cycle with the non-integer video periodicity is a good solution to maintain a low delay, while saving UE power, for high network loads and high traffic generation rates.*

*Observation 4 SFN wrap-around may affect XR traffic by introducing additional delay and resulting in a waste of UE power.*

*Observation 5 It is necessary to enhance C-DRX to cope with traffic jitter, in order to save more UE power, while not increasing the traffic delay significantly.*

*Observation 6 Two-stage DRX saves significant UE power, while not increasing the delay significantly (and thus achieving many satisfied UEs).*

*Observation 7 A single DRX configuration matched to a traffic flow may not be suitable to fulfil the PDBs of other traffic flows, resulting in zero capacity.*

*Observation 8 Multiple simultaneous DRX configurations, each matching a traffic flow, is suitable to achieve both high UE power saving gains and many satisfied UEs, if a single DRX configuration matched to one flow does not satisfy the PDBs of other flows.*

*Proposal 1 Enhance Long DRX formula to match non-integer XR traffic periods as described in this section, by adding two new parameters: (i) a fixed time shift for the start of drx-onDurationTimer; and (ii) a number of DRX cycles after which the new shift should be added.*

*Proposal 2 New integer values in ms for Long DRX cycle lengths (e.g. {8, 9, 11, …, 16, …33, …} ms), close to non-integer XR traffic periodicities are introduced.*

*Proposal 3 Solve the SFN wrap-around problem in the DRX formula, by introducing a counter which increments every time that SFN wraps around.*

*Proposal 4 Adopt the two-stage DRX solution to handle jitter for quasi-periodic XR traffic flows.*

*Proposal 5 Support multiple simultaneous DRX configurations to optimize power saving of UEs with multi-flow XR services.*

*Proposal 6 Switching between pre-configured DRX configurations should not be considered for XR traffic.*

*Proposal 7 Adopt the text proposal below for Section 5.2.2 of TR 38.835.*

[R2-2211860](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2211860.zip) C-DRX enhancements for XR MediaTek Inc. discussion Rel-18 FS\_NR\_XR\_enh [R2-2210651](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2210651.zip)

* Focus on P3-4

*Non-integer DRX cycles:*

*Observation 1: It is not possible to align DRX on-duration occasions with XR traffic using legacy DRX cycles with integer values.*

*Observation 2: eC-DRX using rational DRC cycle value matching CG traffic improves both power savings and UE satisfaction rate compared to Rel-17 C-DRX.*

*Observation 3: Using legacy DRX formulas with non-integer (rational number) DRX cycles do not produce expected results when determining the subframes to start the ODT.*

*Observation 4: By introducing two new parameters per short and long DRX cycles: dividend and divisor in RRC configuration, a wide range of rational number DRX cycles can be supported by Eq6 and Eq7. The valid range for the parameters can be discussed during the work item.*

*Observation 5: With multiple active DRX configuration and multiple start offset solutions for periodicity mismatch issue, RAN2 must decide on the maximum number of configurations, which may not be future proof for supporting different frame rates.*

*Observation 6: Using the new DRX formulas as in Eq 6 and Eq 7, short and long DRX cycles can be supported very easily. Whereas, with the multiple active DRX configuration and multiple start offset solutions, supporting short and long DRX cycles can be complicated.*

*SFN wraparound:*

*Observation 7: If C-DRX cycle values that are not factors of 10240ms are introduced in XR and legacy C-DRX formulas are used, DRX on-duration will go out of sync with XR traffic after the SFN wraparound.*

*Stopping ODT early:*

*Observation 8: Stopping ODT early + eC-DRX provides significant power savings with marginal impact on UE satisfaction rate compared to Rel-17 C-DRX.*

*Observation 9: Stopping ODT early might provide better power savings gain than active time extension (when no data received), because the UE will not have to stay awake longer than needed.*

*Gaps in On Duration:*

*Observation 10: Introducing gaps in ODT + stopping ODT early + eC-DRX provides significant power savings with marginal impact on UE satisfaction rate over Rel-17 C-DRX.*

*Disable DRX retransmission timer for CGs:*

*Observation 11: CG is suitable for transmitting UL pose/control information.*

*Observation 12: With UL traffic periodicity of 4 ms, UE does not have much opportunity to go to sleep between UL transmissions.*

*Observation 13: UL pose/control traffic does not constitute a bottleneck for capacity for XR deployments.*

*Non-integer DRX cycles:*

*Proposal 1: Introduce non-integer (rational number) DRX cycles to match typical XR traffic patterns.*

*Proposal 2: Enhance C-DRX formulas to support non-integer (rational number) DRX cycles, by replacing modulo operation with the floor function as in Eq6 and Eq7 above.*

*SFN wraparound:*

*Proposal 3: Enhance legacy C-DRX formulas to resolve the issue with SFN wraparound when DRX cycle is not a factor of 10240ms.*

*Proposal 4: To solve the SFN wraparound issue while supporting non-integer (rational number) DRX cycles, introduce a new SFN (E-SFN) and update the C-DRX formulas as in Eq8 and Eq9 above.*

*Stopping ODT early:*

*Proposal 5: Reduce DRX on-duration after the arrival of data by stopping ODT to enable the UE to go to sleep early.*

*Gaps in On Duration:*

*Proposal 6: Split the DRX on-duration into groups of smaller on-durations by introducing gaps to maximize opportunities for the UE to go to sleep.*

*Proposal 7: Enhancements for stopping ODT early and splitting DRX on-durations can be combined: The ODT is stopped and remaining on-durations in the group are skipped after the arrival of data.*

*Disable DRX retransmission timer for CGs:*

*Proposal 8: drx-HARQ-RTT-TimerUL and drx-RetransmissionTimerUL are not started for transmissions performed on specific CG configurations, for example, ones reserved for UL pose/control traffic.*

[R2-2211715](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2211715.zip) DRX Enhancements for XR Apple discussion FS\_NR\_XR\_enh

[R2-2212812](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2212812.zip) Discussion on power saving scheme for XR Samsung discussion Rel-18 FS\_NR\_XR\_enh

[R2-2211298](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2211298.zip) Discussion on CDRX enhancement for Power saving OPPO discussion Rel-18 FS\_NR\_XR\_enh

[R2-2211278](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2211278.zip) Further discussion on C-DRX enhancements for XR Huawei, HiSilicon discussion Rel-18 FS\_NR\_XR\_enh

[R2-2211297](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2211297.zip) Discussion on CDRX enhancement for XR service OPPO discussion Rel-18 FS\_NR\_XR\_enh

[R2-2211381](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2211381.zip) C-DRX enhancements for XR traffic Intel Corporation discussion Rel-18 FS\_NR\_XR\_enh

[R2-2211426](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2211426.zip) Considerations on XR jitter handling KDDI Corporation discussion FS\_NR\_XR\_enh

[R2-2211440](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2211440.zip) Enhancements for XR Power Saving CATT discussion Rel-18 FS\_NR\_XR\_enh

[R2-2211494](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2211494.zip) Discussion on DRX enhancements for XR power saving vivo discussion Rel-18 FS\_NR\_XR\_enh

[R2-2211529](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2211529.zip) DRX enhancements for XR ZTE Corporation, Sanechips discussion

[R2-2211588](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2211588.zip) Discussing on XR-specific C-DRX enhancements Xiaomi Communications discussion

[R2-2211925](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2211925.zip) Considerations on XR specific C-DRX power saving enhancements Sony discussion Rel-18 FS\_NR\_XR\_enh

[R2-2212040](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2212040.zip) Discussion of DRX enhancement Lenovo discussion Rel-18

[R2-2212237](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2212237.zip) Candidate solutions on C-DRX enhancement NEC discussion Rel-18 FS\_NR\_XR\_enh

[R2-2212249](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2212249.zip) On DRX enhancements for handling non-integer traffic periodicity Futurewei discussion Rel-18 FS\_NR\_XR\_enh [R2-2209502](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2209502.zip)

[R2-2212332](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2212332.zip) DRX Enhancement for XR Google Inc. discussion

[R2-2212474](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2212474.zip) Discussion on DRX enhancements InterDigital, Inc. discussion Rel-18 FS\_NR\_XR\_enh

[R2-2212579](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2212579.zip) DRX enhancement for power saving in XR LG Electronics Inc. discussion Rel-18 FS\_NR\_XR\_enh

[R2-2212631](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2212631.zip) Discussion on DRX enhancements CMCC discussion Rel-18 FS\_NR\_XR\_enh

[R2-2212770](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2212770.zip) C-DRX enhancements for XR-specific power saving DENSO CORPORATION discussion Rel-18 FS\_NR\_XR\_enh

#### 8.5.3.2 Other enhancements

Including discussion on how traffic and QoS related information on uplink traffic should be provided to RAN for UE power savings.

Online 4 (Wednesday) (2)

[R2-2211495](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2211495.zip) Uplink XR Traffic Information for Power Saving vivo discussion Rel-18 FS\_NR\_XR\_enh

* Focus on P1-2

*Proposal 1: Among the traffic information agreed to be provided from CN to RAN for power saving, the counterpart of uplink traffic which is useful for power saving includes: periodicity for UL traffic of the QoS Flow, end of Data Burst indication. UL traffic jitter information is not useful for power saving.*

*Proposal 2: The following information of uplink traffic is useful for power saving: start time of the first PDU of a PDU set and PDU set size (number of bits), PDU set identity and relationship information among PDUs within the same PDU set.*

*Proposal 3: UE sends an indication to gNB when the last PDU of a data burst in UL buffer has been sent to gNB. FFS whether the indication is a UCI or MAC CE.*

*Proposal 4: Start time and size of PDU set are reported by extending the current BSR. Details are FFS.*

[R2-2212632](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2212632.zip) Discussion on Information for UE power saving CMCC discussion Rel-18 FS\_NR\_XR\_enh

* Focus on P1, P3

*Observation 1: Core network may provide RAN with the following pieces of information: PDU set periodicity and start time, PDU set end indication, PDU set level QoS parameters, PDU set size (number of bits) or number of PDUs in a PDU set, PDU set identity and relationship information among PDUs within the same PDU set, and Jitter information.*

*Observation 2: XR traffic streams in UL has similar characters with DL streams.*

*Proposal 1: The information agreed to provide for RAN for DL in SA2, e.g., PDU Set QoS parameters, can be the baseline of UL.*

*Proposal 2: Static information of UL stream can be acquired by RAN from CN.*

*Proposal 3: RAN2 can further discuss whether start PDU and end PDU of the PDU set, PDU SN and PDU set size should be provided by UE.*

*Proposal 4: PDB/latency information can be reported via BSR, and either residence time or remaining time reporting is possible solution.*

[R2-2211181](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2211181.zip) Non-DRX power saving enhancements for XR Qualcomm Incorporated discussion Rel-18 FS\_NR\_XR\_enh

[R2-2211277](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2211277.zip) Analysis on XR traffic characteristics for C-DRX enhancement Huawei, HiSilicon discussion Rel-18 FS\_NR\_XR\_enh

[R2-2211382](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2211382.zip) Information in RAN for XR traffic and congestion Intel Corporation discussion Rel-18 FS\_NR\_XR\_enh

[R2-2211528](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2211528.zip) Other Power Saving enhancements for XR ZTE Corporation, Sanechips discussion

[R2-2211721](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2211721.zip) PDU Set Parameters and Descriptors Apple discussion FS\_NR\_XR\_enh

[R2-2211776](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2211776.zip) QoS related information in Uplink Nokia, Nokia Shanghai Bell discussion Rel-18 FS\_NR\_XR\_enh

[R2-2212041](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2212041.zip) Discussion of other power saving enhancement Lenovo discussion Rel-18

[R2-2212171](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2212171.zip) Discussion on power saving in XR Spreadtrum Communications discussion Rel-18

[R2-2212172](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2212172.zip) Align the uplink and downlink transmission for XR Spreadtrum Communications discussion Rel-18

[R2-2212206](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2212206.zip) Discussion on power saving impact of packet discard operation Samsung discussion Rel-18 FS\_NR\_XR\_enh

[R2-2212475](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2212475.zip) Discussion on other XR power enhancements InterDigital, Inc. discussion Rel-18 FS\_NR\_XR\_enh

[R2-2212580](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2212580.zip) Information on uplink traffic for power saving LG Electronics Inc. discussion Rel-18 FS\_NR\_XR\_enh

[R2-2212891](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2212891.zip) Discussion on UL and DL traffic information for power saving Ericsson discussion Rel-18 FS\_NR\_XR\_enh

### 8.5.4 XR-specific capacity improvements

No documents should be submitted to 8.5.4. Please submit to 8.5.4.x

#### 8.5.4.1 Feedback enhancements

Including further discussion on how enhanced BSR works for XR (e.g. information needed, overhead, impact to capacity, etc.).

Online 3 (Wednesday) (2)

[R2-2211600](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2211600.zip) BSR for XR Nokia, Nokia Shanghai Bell discussion Rel-18 FS\_NR\_XR\_enh

*Proposal 1: introduce BSR table(s) generated based on traffic characteristics (min, max, shape) signalled to the UE.*

*Proposal 2: introduce a delay information in the BSR as an extension of the current BSR format.*

*Proposal 3: a periodic BSR is triggered when the ON-DURATION is started.*

*Proposal 4: PDU discard triggers a BSR.*

[R2-2212517](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2212517.zip) Discussion on BSR enhancements Futurewei discussion Rel-18 FS\_NR\_XR\_enh

*Proposal 1. RAN2 consider introducing new Buffer Size table(s) to support finer granularity for the Buffer Size field in the BSR.*

*Proposal 2. If new Buffer Size table(s) are to be introduced, a linear quantization scheme should be used.*

*Proposal 3. RAN2 consider standardizing a linear formula with configurable parameters to support finer granularity for the Buffer Size field in the BSR.*

*Proposal 4. If the standardized linear formula is to be introduced, a step size and a starting size can be the configurable parameters used in the formula. FFS: whether value 0 and/or the highest value of the Buffer Size field are interpreted in an open-ended way or not.*

*Proposal 5. Data volume calculation and reporting can be performed for an XR traffic stream on a per data burst basis.*

*Proposal 6. RAN2 decide whether remaining time information is explicitly indicated or not.*

*Proposal 7. If remaining time information is to be explicitly indicated, only one remaining time is explicitly indicated, and based thereon, the other remaining time can be derived by the gNB.*

*Proposal 8. RAN2 adopt the text proposed in the Annex into TR 38.835, under Capacity Improvements Techniques, Layer 2.*

[R2-2211182](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2211182.zip) UE feedback enhancements for capacity improvement Qualcomm Incorporated discussion Rel-18 FS\_NR\_XR\_enh

[R2-2211275](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2211275.zip) BSR feedback enhancements for XR Dell Technologies discussion Rel-18 FS\_NR\_XR\_enh

[R2-2211319](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2211319.zip) Discussion on multi-modal synchronization for XR TCL Communication Ltd. discussion

[R2-2211383](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2211383.zip) Enhancements to Buffer Status Reporting for XR traffic Intel Corporation discussion Rel-18 FS\_NR\_XR\_enh

[R2-2211394](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2211394.zip) Discussion on BSR enhancements for XR Samsung discussion Rel-18 FS\_NR\_XR\_enh

[R2-2211441](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2211441.zip) Further consideration on BSR CATT discussion Rel-18 FS\_NR\_XR\_enh

[R2-2211496](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2211496.zip) Discussion on feedback enhancements for XR-specific capacity improvements vivo discussion Rel-18 FS\_NR\_XR\_enh

[R2-2211530](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2211530.zip) fFeedback enhancements for XR capacity ZTE Corporation, Sanechips discussion

[R2-2211590](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2211590.zip) Discussing on UE feedback enhancements for XR capacity Xiaomi Communications discussion

[R2-2211716](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2211716.zip) Considerations for BSR Enhancements Apple discussion FS\_NR\_XR\_enh

[R2-2211926](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2211926.zip) Considerations on BSR Sony discussion Rel-18 FS\_NR\_XR\_enh

[R2-2211960](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2211960.zip) Discussion on feedback enhancement OPPO discussion Rel-18 FS\_NR\_XR\_enh

[R2-2211975](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2211975.zip) Discussion on BSR enhancement for XR-specific capacity improvement Huawei, HiSilicon discussion Rel-18 FS\_NR\_XR\_enh

[R2-2212139](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2212139.zip) Discussion of UE feedback enhancements Lenovo discussion Rel-18 FS\_NR\_XR\_enh

[R2-2212173](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2212173.zip) BSR enhancement on XR Spreadtrum Communications discussion Rel-18

[R2-2212235](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2212235.zip) BSR enhancements for XR NEC discussion Rel-18 FS\_NR\_XR\_enh

[R2-2212318](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2212318.zip) BSR enhancement for XR capacity MediaTek Inc. discussion Rel-18

[R2-2212476](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2212476.zip) Discussion on XR-specific feedback enhancements InterDigital, Inc. discussion Rel-18 FS\_NR\_XR\_enh

[R2-2212636](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2212636.zip) Enhancement on BSR for XR-specific capacity improvement CMCC discussion Rel-18 FS\_NR\_XR\_enh

[R2-2212715](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2212715.zip) Discussion on Feedback enhancements for XR-specific capacity improvements III discussion FS\_NR\_XR\_enh

[R2-2212771](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2212771.zip) Discussion on UE feedback enhancements for XR capacity DENSO CORPORATION discussion Rel-18 FS\_NR\_XR\_enh

[R2-2212783](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2212783.zip) draft Reply LS on XR and Media Services on Network exposure Xiaomi Communications LS out Rel-18 FS\_XRM, FS\_NR\_XR\_enh To:SA2 Cc:RAN1, RAN3

[R2-2212787](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2212787.zip) Discussion on BSR enhancement for delay information in XR LG Electronics Inc. discussion Rel-18 FS\_NR\_XR\_enh

[R2-2212885](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2212885.zip) Discussion on BSR enhancements Ericsson discussion Rel-18 FS\_NR\_XR\_enh

*Withdrawn:*

[R2-2211318](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2211318.zip) Discussion on multi-modal synchronization for XR TCL Communication Ltd. discussion Withdrawn

#### 8.5.4.2 Scheduling enhancements

Including discussion on scheduling enhancements to improve XR capacity.

Including discussion on RAN2 aspects of CG enhancements and UE assistance information for XR.

Online 2/3 (Tuesday/Wednesday) (3)

[R2-2212890](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2212890.zip) Discussion on Scheduling enhancements Ericsson discussion Rel-18 FS\_NR\_XR\_enh

*Observation 1 Utilizing CG to increase PDCCH capacity is not necessary since PDCCH capacity is not assumed to be a problem for XR*

*Observation 2 CG for XR data (large allocations) performs equal or worse than basic DG*

*Observation 3 When scheduler is aware of detailed traffic periodicity information utilizing DG with prescheduling performs better than CG with large allocations*

*Observation 4 A hybrid approach of using CG for BSR transmissions and DG for video data transmissions work well but is already fully supported by the standard*

*Observation 5 Addressing shortcomings of CG requires a complex signalling coming with delay and its cost is higher than benefits.*

*Observation 6 UL jitter (if any) and packet size information can be learned by gNB based on SR/BSR without explicit indication.*

*Proposal 1 RAN2 should consider that CG enhancements are not needed in Rel-18 XR*

*Proposal 2 Additional assistance information is not needed to configure UL CG.*

*Proposal 3 Introduce the draft TP attached in the Annex*

[R2-2212936](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2212936.zip) Discussion on scheduling enhancements NTT DOCOMO, INC. discussion Rel-18

*Observation1: In XR service, there exists interactive service period where both UL and DL data arrives frequently. Efficient scheduling DL/UL traffic and DRX config in the corresponding period is considered to be important to fulfill XR service low latency and power saving requirement.*

*Proposal1: UE to send XR interactive service period related assistance info (e.g., interactive service period’s starting time, end time, cycle length, periodicity, uplink data arrival periodicity, jitter, etc) to network for efficient CG scheduling and DRX configuration purpose.*

[R2-2211601](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2211601.zip) Capacity Enhancements for XR Nokia, Nokia Shanghai Bell discussion Rel-18 FS\_NR\_XR\_enh

*Proposal 1: investigate blind retransmissions of RLC PDUs.*

*Proposal 2: investigate the concatenation of PDCP SDUs belonging to the same PDU set at PDCP.*

*Proposal 3: RAN2 to confirm it is already possible to configure and simultaneous activate multiple overlapping CG configurations.*

*Proposal 4: the restriction of no HARQ process sharing for licensed band should be lifted to allow more flexibility for NW configuration.*

*Proposal 5: The UE may take TBS of the CG and buffered data into account (on top of existing LCP restrictions and LCH prioritization rules) when selecting an UL grant to use when there are multiple grants.*

[R2-2211527](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2211527.zip) Scheduling enhancements for XR ZTE Corporation, Sanechips discussion

*- CG and DG enhancements*

*Proposal 1: Multiple CG grants can be configured to the UE to handle traffic with more than one inherent periodicity within the XR traffic*

*Observation: Using CG for traffic that has significant variance in packet size over time is suboptimal and hence some optimisations are necessary*

*Proposal 2: Combination of CG with DG could be used to minimise the latency for packets that exceed the CG grant size*

*Proposal 3: To minimise the UL latency for traffic that exceeds the CG grant size, RAN2 should study mechanisms where the UE can include an indication such as BSR whenever the pending UL data exceeds the CG grant size*

*- UE assistance information for gNB scheduler*

*Proposal 4: RRC level assistance information could be used for providing long-term assistance information from UE to RAN for XR*

*Proposal 5: UE Assistance Information (UAI) framework is reused for the long-term assistance information for XR*

*Proposal 6: The long-term assistance information for XR could include information such as the Periodicity, Burst size, Burst size variance, Burst timing associated with XR traffic*

*Proposal 7: Time critical UE assistance information such as need to activate/deactivate certain CG resources depending on the codec modes used etc should be provided using MAC level assistance information (i.e. MAC CEs).*

*- Assistance information from RAN to CN*

*Proposal 8: Exposure of RAN status to CN and UE upper layers should be considered for XR capacity improvement*

*Proposal 9: RAN2 should investigate the following RAN status information to be exposed to CN (XR application server) and/or UE (XR application) – reusing the framework defined for the RAN-assisted codec adaptation*

*- Preferred arrival time for a given PDU set (e.g. I frames)*

*- Load situation in RAN*

*- Preferred data rate/Codec modes*

[R2-2212637](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2212637.zip) Enhancement on CG for XR-specific capacity improvement CMCC discussion Rel-18 FS\_NR\_XR\_enh

*Proposal 1: CG scheduling to be used for UL pose/control information.*

*Proposal 2: CG scheduling to be used for UL AR traffic jointly with DG.*

*Proposal 3: Multiple PUSCH occasions in a CG period is useful for UL AR traffic.*

*Proposal 4: Support joint activation of multiple CG configurations.*

*Proposal 5: CG periodicities require enhancement to align with UL AR traffic periodicities*

*Proposal 6: Retransmission-less CG configuration could be studied for better system capacity and better UE power saving.*

[R2-2211183](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2211183.zip) Scheduling enhancements for capacity improvement Qualcomm Incorporated discussion Rel-18 FS\_NR\_XR\_enh

[R2-2211276](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2211276.zip) CG scheduling enhancements for XR Dell Technologies discussion FS\_NR\_XR\_enh

[R2-2211384](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2211384.zip) Scheduling enhancements for XR traffic Intel Corporation discussion Rel-18 FS\_NR\_XR\_enh

[R2-2211442](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2211442.zip) Further consideration on XR-specific capacity improvement CATT discussion Rel-18 FS\_NR\_XR\_enh

[R2-2211497](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2211497.zip) Discussion on scheduling enhancements XR-specific capacity improvements vivo discussion Rel-18 FS\_NR\_XR\_enh [R2-2209491](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2209491.zip)

[R2-2211592](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2211592.zip) Discussing on XR-specific scheduling enhancements Xiaomi Communications discussion

[R2-2211717](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2211717.zip) Configured Scheduling and UE-Assistance Information for XR Apple discussion FS\_NR\_XR\_enh

[R2-2211927](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2211927.zip) Considerations on XR specific capacity improvements Sony discussion Rel-18 FS\_NR\_XR\_enh

[R2-2211928](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2211928.zip) UL Scheduling enhancement for XR traffic and evaluation results Sony discussion Rel-18 FS\_NR\_XR\_enh

[R2-2211952](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2211952.zip) Discussion on SR configuration for XR uplink traffic transmission TCL Communication discussion Rel-18

[R2-2211961](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2211961.zip) Discussion on scheduling enhancement OPPO discussion Rel-18 FS\_NR\_XR\_enh

[R2-2212042](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2212042.zip) Discussion of scheduling enhancement Lenovo discussion Rel-18

[R2-2212174](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2212174.zip) Scheduling enhancement on XR Spreadtrum Communications discussion Rel-18

[R2-2212236](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2212236.zip) UE assistance information for CG configuration at gNB NEC discussion Rel-18 FS\_NR\_XR\_enh

[R2-2212319](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2212319.zip) Scheduling enhancement for XR capacity MediaTek Inc. discussion Rel-18

[R2-2212333](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2212333.zip) Scheduling Enhancement for XR Google Inc. discussion

[R2-2212477](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2212477.zip) Discussion on scheduling enhancements InterDigital, Inc. discussion Rel-18 FS\_NR\_XR\_enh

[R2-2212650](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2212650.zip) Discussion on UE Assistance Information for CG configuration Samsung discussion Rel-18 FS\_NR\_XR\_enh

[R2-2212788](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2212788.zip) Discussion on XR-specific Scheduling enahancement LG Electronics Inc. discussion Rel-18 FS\_NR\_XR\_enh

[R2-2212002](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_120/Docs/R2-2212002.zip) Discussion on scheduling enhancements NTT DOCOMO, INC. discussion Rel-18