

Discussion on scope of R18 XR WI

Agenda Item: 9.2.10
Source: Xiaomi
Document for : Discussion and decision

Summary of Rel-18 SI on XR

- In RAN2#120 F2F meeting, most of companies in RAN2 think objective on XR awareness is not complete because of SA2 progress.
- People have different views on whether to push to WI or to extend SI by 3 months. And the final decides are made by RAN#98.

RAN2#120 meeting minutes:

- => Majority of companies in RAN2 thinks the objective on XR awareness is not complete because of SA2 progress. Further discussion on how to handle RAN2 impacts of SA2 and SA4 decisions would be necessary (e.g. PDU set handling in AS).
- => RAN2 thinks the objectives on power saving and capacity enhancement are completed.
- => RAN2 intends to send the TR to RAN for information



Briefs on SA2 latest progress

■ SA2's latest progress in SA2#154 meeting:

- SA2 SI study (FS_XRM) is complete 100% (S2-2211189, FS_XRM status after SA2#154). There are further cooperation with RAN WGs and SA4 in normative phase.

WI Code	Work Item Title	WP	Target Date	WID#
FS_XRM	Study on XR (Extended Reality) and media services	90% → 100%	Dec, 2022	SP-220705

- SA2 new WID (Architecture Enhancements for XR and media services) is agreed.
- SA2 has confirmed that different types of PDU sets can be from one QoS flow and the EN on whether PDU Set importance is used for mapping different QoS Flows, sub-QoS Flows, or included in GTP-U header is resolved (S2-2211440).

- 8.4.2.3 Delivering PDU Set Information to RAN .

PDU Set Information (listed in 8.4.2.1) are informed by UPF to RAN via GTP-U header of user plane packet. .

- ~~Editor's Note: Whether PDU Set importance is used for mapping different QoS Flows, sub-QoS Flows, or included in GTP-U header is FFS. (Potential SoH) .~~

■ SA2 has identified the information provisioning to RAN for PDU set packet handling, including PDU Set QoS parameters provided via control plane as well as PDU Set information provided by user plane:

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

=> **Xiaomi's view:**

- RAN is suggested to consider starting the R18 XR WI because most of SA2 work has been finished.



Discussing on WID scope of XR-awareness

- Considering application layer attributes RAN2 has studied the options on handling of PDU Sets in radio protocols e.g., in-sequence delivery of PDU sets, differentiated PDU set handling and RAN2 has agreed to exclude the option of N1N :
 - Option111/NN1/N11 are still on the table;
- RAN2 has studied the option on how to demultiplexing of different types of PDU sets from one QoS flow on multiple DRBs in the AS:
 - Splitting DRB into multiple LCH (DC like) FFS.
- RAN2 has agreed to support timer-based discarding of UL transmit side of PDCP PDU/SDUs of a PDU set. FFS how this is modelled in PDCP specification, can be discussed in WI phase.
- RAN2 has no intention to pursue PDU prioritization which should not be in the WID scope.
- For RAN information exposure in SA2's KI#3 , RAN2 and RAN3 has replied to SA2 that we have enough tools available to assess congestion.
- For the potential information listed by SA2 concerning KI#4, 5 and 8 , RAN3 identified potential spec impacts which require detailed discussions, and RAN3 would like to address them when normative work on XR will be started

=>Xiaomi's view:

- RAN is suggested to specify mechanisms on handling of PDU Sets in radio protocols, e.g., splitting DRB into multiple LCH to meet application layer requirement (e.g., whether in-sequence delivery of PDU sets should be provided by AS, whether different types of PDU should be treat differently).
- RAN is suggested to specify mechanisms for PDCP discarding based on PDU set.
- For RAN information exposure, it is suggested to support the RAN information exposure, including congestion information, data rate information, etc., as required by other WGs
- From RAN3 perspective, it is suggested to specify the potential signalling and procedures to support the XR functionalities as required by RAN1/RAN2/SA2.



Discussing on WID scope of XR-specific Power Saving

- In the previous RAN2 meetings of SI, there are already options on the table to address the issues of Non-integer valued DRX cycles as well as SFN wrap round. RAN2 should down-select the options in WI.

- RAN1 has confirmed that a gNB dynamically select and indicate UE a proper on duration start time to handle the instantaneous jitter is not applicable:

RAN1#110 meeting minutes:

=> RAN1 does not assume instantaneous jitter value for a frame is predictable for Rel-18 XR SI power saving study before further input is provided by SA.

- Majority in RAN2 prefer C-DRX enhancement to allow XR frame rates that correspond to non-integer periodicities in a semi-static manner (e.g. RRC), i.e., the dynamic manner should be deprioritized.

■ RAN1's progress on PDCCH monitoring enhancement:

- Several PDCCH monitoring enhancement solutions including enhancement on PDCCH skipping/SSSG switching have been proposed and extensively discussed,
- No consensus on which solutions should be supported in RAN1.

=> **Xiaomi's view:**

- RAN is suggested to specify C-DRX enhancement to allow XR frame rates that correspond to non-integer periodicities in a semi-static manner (e.g. RRC), i.e., the dynamic adaptation should be deprioritized.
- RAN is suggested to specify PDCCH monitoring enhancement (e.g., PDCCH skipping).

Discussing on WID scope of XR-specific capacity improvements



■ RAN2's progress on XR-specific capacity improvements:

- In RAN2#120 meeting, RAN2 has confirmed that one or more additional BSR table(s) for XR will be needed and the details can be discussed in WI phase.
- In RAN2#120 meeting, RAN2 also confirmed that we will introduce extension of BSR to associate data volume information with delay information (e.g. remaining time) to allow timely availability of buffer status information at gNB. This can be discussed in WI phase.

■ RAN1's progress on CG enhancement:

- Multiple CG PUSCH transmission occasions in a period of a single CG PUSCH configuration.
- Dynamic indication of unused CG PUSCH occasion(s) based on UCI (e.g., CG-UCI or a new UCI) by the UE.

=> **Xiaomi's view:**

- RAN is suggested to specify mechanisms that provide more efficient resource allocation and scheduling for XR service by CG enhancement. Down link SPS and Dynamic scheduling/grant enhancements are not considered.
- RAN is suggested to specify mechanisms that provide more efficient resource allocation and scheduling for XR service by BSR enhancement.

- Proposal 1: RAN is suggested to consider starting the Rel-18 XR WI because most of SA2 work has been finished.
- Proposal 2: RAN is suggested to consider the following objectives for Rel-18 XR WID:

The objective is to specify support for the following enhancements:

XR-awareness in RAN (RAN2, RAN3):

- Specify mechanisms at the RAN level to handle XR traffic (both UL and DL) considering XR traffic characteristics, QoS metrics (for instance importance, PSER, and/or PSDB), and application layer attributes (e.g., whether in-sequence delivery of PDU sets should be provided by AS, whether different types of PDU should be treated differently). Focus is on the following techniques:
 - Splitting DRB into multiple LCH (DC like);
 - PDCP discarding based on PDU set;
 - RAN information exposure, including congestion information, data rate information, etc., as required by other WGs.

Note: This objective requires SA2 and CT1 involvement.

XR-specific Power Saving (RAN1, RAN2):

Specify XR specific power saving techniques to accommodate XR service characteristics (periodicity, multiple flows, jitter, latency, reliability, etc...). Focus is on the following techniques:

- C-DRX enhancement to allow XR frame rates that correspond to non-integer periodicities in a semi-static manner (e.g. RRC);
- PDCCH monitoring enhancement (e.g., PDCCH skipping).

XR-specific capacity improvements (RAN1, RAN2):

Specify mechanisms that provide more efficient resource allocation and scheduling for XR service characteristics (periodicity, multiple flows, jitter, latency, reliability, etc...). Focus is on the following mechanisms:

- CG enhancements;
- BSR enhancement;

Note: For all the 3 objectives, RAN3 specify the signalling and procedures in NG-RAN to support the XR functionalities as required by RAN1, RAN2 and SA2.



THANKS!