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Views on user plane protocol enhancements in Rel-19

Qualcomm Incorporated

Background

- There have been proposals in previous RAN meetings for a Rel-19 Study or Work Item on NR User Plane (UP) enhancements:
  - There was also a more limited proposal on PDCP-level concatenation in Rel-18. This proposal was not agreed since it was deemed that any major changes to NR UP was too late.
- For Rel-19, the proposals from other companies can be classified into two main categories:
  - Introducing new features to NR UP
  - A pre-6G study on UP
- As in Rel-18, we still think major changes to NR UP is too late and chances of such features getting deployment is very low:
- A pre-6G study will also not be productive, given the many unknowns for 6G architecture.

Scope of a possible Rel-19 Study/Work

- As Rel-18 wraps up, the current User Plane implementation has been tested in many deployment scenarios.
- Throughout those deployments, there has been sufficient opportunity to identify gaps and inefficiencies in the current User Plane specs.
- A Rel-19 work on NR UP can be acceptable if it can be limited to fixing these critical issues found in the NR deployments:
  - The changes should be justified based on actual problems discovered in the field.
  - The work should not consume many TUs and only be done within RAN2
  - It can be regarded as a collection of multiple TEIs. A short study phase is feasible to determine the actual problems.
- In the following slides, we discuss some of the issues in current NR deployments in more detail.

Improve UE and gNB window management

- Introduce enhancements in PDCP/RLC window management.
  - One important area is to avoid unnecessary RLC (re)transmissions after PDCP window advances.
  - This issue is also pronounced in MR-DC with asymmetric data rates, as the slower leg may keep retransmitting already received PDUs in DL or stall the PDCP/RLC window in UL.
- Enhancement can include the ability of UE and gNB to exchange information to improve performance.
- Good alignment between UE and gNB PDCP/RLC window also improves UE memory utilization and power consumption.
- Proposal 1: **RAN2 to study enhancements to UE and gNB PDCP/RLC window management.**

Improving User Plane Latency

- Currently, existing RLC retransmission mechanisms have a latency-floor related to the time to acquire a STATUS PDU and retransmit Nacked PDUs.
- Another cause for high L2 latency across L2 UL/DL is the static nature of PDCP/RLC timers e.g., t-Reassembly and PDCP discard timer.
- Proposal 2: **RAN2 to study methods to reduce user plane latency with a focus on tail-latency.**

Summary

- SI in Rel-19 should identify specific gaps in current UP design. This SI should evolve to a WI within Rel-19 after gaps have been identified to pursue UP enhancements.
- It is proposed to address the following UP objectives for the Rel-19 UP scope.

- **Proposal 1: RAN2 to study enhancements to UE and gNB PDCP/RLC window management.**
- **Proposal 2: RAN2 to study methods to reduce user plane latency with a focus on tail-latency.**

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