3GPP TSG-RAN WG3 #114 R3-215831

1 - 11 Nov 2021

Online

Agenda Item: 9.3.6.1

Source: Samsung - Moderator

Title: Summary of Offline Discussion – F1-U Delay Measurement

Document for: Approval

# Introduction

This is the summary document for the following come back:

**CB: # 28\_F1-Udelay**

**- Prefer solution 3 (use dedicated polling and add NR-U SN in DDDS), and solution 2 (add NR-U SN in DDDS) is also acceptable?**

**- Provide CR if agreeable**

(Samsung - moderator)

Summary of offline disc [R3-215831](C:\\Users\\Downloads\\Inbox\\R3-215831.zip)

Two phases of this email discussion:

* Phase 1 Deadline: **12:00AM UTC, 5th Nov**.
* Phase 2 Deadline: **12:00AM UTC, 9thNov**. Try to have an agreeable CR in the 2nd phase discussion.

# For the Chairman’s Notes

Propose the following:

**Continue the discussion based on Solution 3 and Solution 3 variant:**

* **Solution 3: Use a dedicated polling function, and enhance DDDS reporting by adding NR-U sequence number.**
* **Solution 3 variant: Use a dedicated polling function, and enhance DDDS reporting by adding feedback time.**

# Discussion

Polling function and DDDS reporting can be used for F1-U delay measurement. So F1-U delay is (T4-T1)/2, where the inner DU feedback delay is negligible.

There are three candidate solutions:

* **Solution 1**: Reuse current polling function and DDDS reporting. No update is needed.
* **Solution 2**: Based on current polling function and DDDS reporting, add NR-U sequence number in DDDS.
* **Solution 3**: Use a dedicated polling function, and enhance DDDS reporting by adding NR-U sequence number. When the received dedicated polling equals to 1, DU feeds back the DDDS with NR-U sequence number immediately for F1-U delay measurement.

Solution 1 is the simplest one. But it may lead to wrong measurement when DU sends one DDDS before receiving the DL User Data with polling from CU-UP.

Solution 2 allows CU-UP to correctly identify which DL USER DATA with polling is the one that it should calculate F1-U delay. But adding NR-U SN in every polling-triggered DDDS may produce back-compatible problem and heavy overhead.

Solution 3 leads to high accurate and efficient measurement. The dedicated polling function informs DU that the polling is for F1-U delay measurement so that DU need to do the quick feedback to guarantee the negligible inner DU feedback delay. And DU adds NR-U SN in DDDS only when the received dedicated polling flag equals one, which makes the DDDS reporting more efficient.

**Q1-1: Companies are invited to provide their views on above three solutions, which solution is preferred.**

|  |  |  |
| --- | --- | --- |
| **Company** | **Preferred Solution 1, Solution 2 or Solution 3** | **Comment** |
| Intel Corporation | Solution 2 or Solution 3 | It is clear that the current polling function (Solution 1) cannot meet the SA5 requirement of taking the feedback delay time into account when measuring F1-U delay.  Either Solution 2 or Solution 3 should be introduced to make it supported. But we also agree with the moderator's analysis on Solution 2 that adding NR-U SN in every polling-triggered DDDS may incur heavy overhead.  Or, if "immediate DDDS trigger" is a burden to implementation, we can consider Solution 3 variant that uses a dedicated polling, but reports feedback delay time in DDDS so that DU doesn't have to immediately trigger DDDS. |
| Huawei | 2 or 3 | We don’t think solution 1 is sufficient.  Basically, solution2 and 3 either works. The one having minimized spec impact should be selected.  The solution 3 variant seems also feasible, but it would be good if further clarification on when the DU will trigger the differed DDDS to CU? And how to impact the F1U delay or even the E2E RAN part delay calculation? |
| Samsung | Prefer Solution 3 variant or Solution 3 | Solution 1 is not sufficient.  Solution 2 can work but may have the overhead problem.  Both Solution 3 variant and Solution 3 can solve this issue well with high accurate and efficient measurement. They avoid the problem of wrong measurement and overhead. Solution 3 variant also deals with the “immediate DDDS” burden. So prefer Solution 3 variant or Solution 3. |
| Ericsson | Solution 1 | Solution 1 works perfectly well because the poll function has been introduced to let the DU report the DDDS PDU immediately. If the gNB-DU di dnot report it immediately, there could be new transmissions and acknowledgements that would not reflect the DL status at the time the polling flag has been received. Any delay introduced by the processing of the polling flag is negligible when compared to the F1-U delay. |
| ZTE | Solution 1 | If considering per-packet delay measurement for QoS monitoring, maybe we need enhancing NR-U. However, the current delay reported by RAN side is average delay, it is common approach in implementation to filter some outlier values when calculating the mean, so we think solution 1 by using current poll function is sufficient, no more enhancement is needed. |
| Nokia | Solution 1 | No more enhancement needed. |
| CATT | Solution 1 | Similar view with E/// |
| Verizon | Prefer Solution 3, but ok with Solution 2. | A solution is definitely desired for F1-U delay. Solution 1 has consistency issue depending on how vendors interpret/consider the feedback delay and use it in their implementations. This causes problems in multi-vendor scenario. Also it causes an issue for operators who have multiple vendors in their networks and the reported delays on F1-U are inconsistent across different vendors in the network. So solution 1 does not address operator requirements. Both solutions 2 and 3 resolve the inconsistency issue. Solution 2 is fine but might have overload issues. Solution 3 is efficient and hence preferred. |
| CMCC | Prefer solution 3 | Solution 1 is not sufficient. Solution 2 may incur overhead issues. Solution 3 or solution 3 variant can be pursued. |
| KDDI | Solution 3 | Solution 1 is not sufficient to solve consistency issue on RAN vendors’ implementation as Verizon pointed out.  Solution 2 can work, but also increase overhead.  Solution 3 is efficient and preferred. |
| China Unicom | Solution 3 | If consider the efficiency, solution 3 is the first option. If we just want to solve the issue, solution 2 can work but the extra overhead is introduced. |

**Q1-2: If preferring any other solution, please provide here.**

|  |  |
| --- | --- |
| **Company** | **Comment** |
| Intel Corporation | Please see the above for Solution 3 variant that does not have to mandate DU to trigger DDDS immediately and does not have the overload problem of Solution 2. If "immediate DDDS" is a serious burden to implementation, we can consider this Solution 3 variant. |
| Huawei | See above comment. |
| Samsung | Support Solution 3 variant. |
| Nokia | Echo request could be an alternative, but solution 1 seems ok. |
| Verizon | We are fine to consider some variations of Solution 3. But it is important to solve the issue. See comments to 1-1. |
| China Unicom | We are not in favor of the variations, from our understanding, this is related with the implementations. |

**Moderator’s summary:**

7 companies think solution 1 is not sufficient and prefer solution 3 or solution 3 variant; 4 companies think no need to update as solution 1. So based on views of majority companies especially operators’ requirement, propose continue to discuss based on solution 3 and solution 3 variant.

**Continue the discussion based on Solution 3 and Solution 3 variant:**

* **Solution 3: Use a dedicated polling function, and enhance DDDS reporting by adding NR-U sequence number.**
* **Solution 3 variant: Use a dedicated polling function, and enhance DDDS reporting by adding feedback time.**

# Conclusion

The following is proposed:

**Continue the discussion based on Solution 3 and Solution 3 variant:**

* **Solution 3: Use a dedicated polling function, and enhance DDDS reporting by adding NR-U sequence number.**
* **Solution 3 variant: Use a dedicated polling function, and enhance DDDS reporting by adding feedback time.**

# References

1. R3-215559, Discussion on F1-U Delay Measurement for QoS Monitoring, Samsung, Verizon Wireless
2. R3-215560, Correction of F1-U delay measurement for QoS monitoring, CR0132r TS 38.425, Samsung, Verizon Wireless