**3GPP TSG-RAN WG2 Meeting #113-e *draft* R2-2102388**

**Online, 25th Jan – 5th Feb 2021**

**Agenda item:** 8.13.4

**Source:** vivo (Rapporteur)

**Title:** The report of[Offline-822][NR R17 SONMDT] M6 (vivo)

**Document for:** Discussion and Agreement

# 1 Introduction

This is to report the result of the following email discussion at RAN2#113-e meeting [1].

* [AT113-e][822][NR/R17 SON/MDT]  M6 (vivo)

 For QoS monitoring related delay reporting to CN, RAN2 to choose one of the following options for the total delay measurement M6 over MCG/SCG for split bearers WITHOUT PDCP duplication.

 Option a: the maximum value between two legs;

 Option b: weighted average (consider the number of packets) over MN and SN;

 Option c: simply by average the values of M6 from MN and M6 from SN;

 Option d: raw data (separate delay in MN and SN);

 Option e: no differentiation

 Intended outcome: Agreeable WF

 Deadline: Thursday 04/02/2021

According to the chair’s guidance, this report is used to collect companies’ views on the measurement options regarding M6 for split bearers without PDCP duplication, and to find an agreeable way forward.

Companies are welcome to provide their opinions by Thursday 04/02/2021, UTC 12:00.

# 2 Contact Information

To make it easier to find the correct contact delegate in each company for potential follow-up questions, the rapporteur encourages the delegates who provide input to provide their contact information in this table:

|  |  |
| --- | --- |
| Company | Contact: Name (E-mail) |
| vivo | WenMing (ming.wen@vivo.com) |
| Ericsson | Pradeepa Ramachandra (pradeepa.ramachandra@ericsson.com) |
| Qualcomm | Rajeev Kumar (rkum@qti.qualcomm.com) |
| oppo | Liu Yang (liuyangbj@oppo.com) |
| Nokia, Nokia Shanghai Bell | malgorzata.tomala@nokia.com |
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| ZTE | Zhihong Qiu (qiu.zhihong@zte.com.cn) |

# 3 Discussion

How to measure the total delay measurement M6 over MCG/SCG for split bearers WITHOUT PDCP duplication was firstly discussed in the *[Post112-e][852] R17 L2M enhancement* [2], companies’ views are split on this issue, and no consensus is achieved during the online session.

There are also contributions [3][4][5] submitted to this meeting that are relevant to this topic. Both [3][4] are supportive of **Option b (weighted average)**, the argument is that the weighted average considering the number of packets over MN and SN can reflect accurately the average total delay of all the packets of the same split bear over MN and SN. While [5] states that generally the RAN part of delay is to get averaged values, but from NW’s point of view, both **min and max values** are also useful for delay measurement monitoring, the maximum and minimum values can be used for network layer delay demarcation and locating.

Nonetheless, more companies are invited to provide their feedback on this issue so that we can find an agreeable WF based on the majority view.

Question: Which of the option should be used to measure the total delay measurement M6 over MCG/SCG for split bearers WITHOUT PDCP duplication.

* Option a: the maximum value between two legs;
* Option b: weighted average (consider the number of packets) over MN and SN;
* Option c: simply by average the values of M6 from MN and M6 from SN;
* Option d: raw data (separate delay in MN and SN);
* Option e: no differentiation.
* Option f: others (please specify).

|  |  |  |
| --- | --- | --- |
| Company | Option a/b/c/d/e/f… | Detailed Comments |
| Ericsson | Option-B | Option-A is not ‘average RAN delay’ and it is neither the ‘maximum RAN delay’ as the maximum of two averages (one is total MCG delay and the other is total SCG delay)! Therefore, this value does not represent average RAN delay.As explained in our contribution (R2-2101417), the only way to get ‘correct’ information is option-B. I am copy-pasting an example we had provided in our contribution (R2-2010045) to highlight the limitations of option-C.Example scenario with split bearer related DL transmission without PDCP duplication

|  |  |
| --- | --- |
| Number of packets sent over MCG during the measurement period | 100  |
| Total delay experienced on MN side (other than CU-UP delay): D1+D2+D3 | 15ms |
| Number of packets sent over SCG during the measurement period | 20 |
| Total delay experienced on SN side (other than CU-UP delay): D1+D2+D3 | 3ms |

If a simple averaging of the above measurements are used, then the total RAN delay would be (15 + 3)/2 i.e., 9 ms. So, the CN is reported that the average packet delay in the RAN is 9ms. However, this is misleadingUsage of option-c could lead to ‘large errors’ in the reported value.Option-D is applicable for the immediate MDT reporting. We need to find a single value to represent the total average RAN delay. Therefore, option-D is not applicable.Option-E is same as option-C. |
| Qualcomm | Option B | We agree with Ericsson arguments. Furthermore, note that the purpose of these capturing the delay measurements is to develop any optimization scheme for routing the packet in the network. Providing the wrong information not only destroy the whole effort of studying the M6 delay measurements but also lead in erroneous network behaviour.  |
| oppo | Option B | Seems the most feasible one, according to Ericsson proof |
| Sharp | Option b (or option e?) | We also share Ericsson’s analysis. For split bearer without duplication, it is reasonable to define this measurement as RAN delay averaged among all packets sent via both MN and SN, e.g. (100\*15+20\*3)/(100+20) in Ericsson’s example. Actually option e is not clear to us. If option e can be interpreted as no different treatments for packets via MN and SN. e.g. averaged delay among all packets via MN and SN , this is somehow the same to option b. |
| Nokia, Nokia Shanghai Bell | Option B | We agree with Ericsson |
| Huawei, HiSilicon | Option C | For the following comments from Ericsosn paper R2-2101417 on average values (option C):*However, we believe this will result in wrong average delay calculation for the scenarios wherein the number of packets sent over MCG and the number packets sent over the SCG are very different.*We also have the following assumption:

|  |  |
| --- | --- |
| Number of packets sent over MCG during the measurement period | 1000 |
| Total delay experienced on MN side (other than CU-UP delay): D1+D2+D3 | 2ms |
| Number of packets sent over SCG during the measurement period | 10 |
| Total delay experienced on SN side (other than CU-UP delay): D1+D2+D3 | 50ms |

In this case, even if there are different delay values for MCG and SCG links, the result is: (2\*1000+10\*50)/1010=2.47ms, and it is very close to 2ms (the delay from MCG link).One may argue about the number difference (1000/10), and we think it is possible because it depends on RRM decisions. In our opinion, for this case, it is very likely that some bad packets happen on SCG link. With option C, the result is 26ms.So for our assumption, the results are:* Option B: 2.47ms
* Option C: 26ms

Back to our first comment, the criteria of a correct “calculation” is to be justified. 2.47ms is good but it hides some important facts.If there are appropriately equal number of packets from MCG and SCG links, option C still works well.What we are now discussing is about QoS monitoring, we do not want to have a solution that simply ignores those “bad” packets. If so, network receives complaints, but has no idea about the root reason as the delay KPI is always good. |
| CATT | Option B | Option B of weighted average could reflect the delay of RAN part in an effective way, to consider both the DC structure and the wireless condition of both legs. Therefore it seems to be the more reasonable option compare with Option A and C.Option D could be used for performance assurance (send the measurement result to OAM/TCE) but not for QoS monitoring. |
| Apple | Option B | We also think Ericsson’s arguments make sense. |
| vivo | Option B | Option B should be the right choice as explained by Ericsson.We can further discuss whether it is needed to report the max delay value to NW as a supplement if the majority thinks the worse situation should also be reflected in data collection. |
| ZTE | Option D or option B with clarification on the use case | As commented in our contribution, option D allows NW can combine the delay components to fulfill different use case.For example, for QoS monitoring a total delay including RAN node delay as well as UE reported UL PDCP delay is required, and it is make more sense to consider the weighted measurements;For RAN node performance observibility, RAN node delay excluding UE reported UL PDCP delay is needed per SA2’s requirement. However considering there is a majority to go with option B, we are fine to go with option B but with clarification that it is for QoS monitoring. |

**Conclusion:**

10 companies provided inputs to this issue, the number of companies supporting each option can be summarized as following:

|  |  |  |  |
| --- | --- | --- | --- |
| Option B | Option C | Option D | Option E |
| 9 companies | 1 company | 1 company | 1 company |

Based on the majority view (9 out of 10), the rapporteur proposes:

1. For QoS monitoring related delay reporting to CN, ‘weighted average (consider the number of packets) over MN and SN’ is used to calculate the total delay measurement M6 over MCG/SCG for split bearers WITHOUT PDCP duplication.

# 4 Conclusion

1. For QoS monitoring related delay reporting to CN, ‘weighted average (consider the number of packets) over MN and SN’ is used to calculate the total delay measurement M6 over MCG/SCG for split bearers WITHOUT PDCP duplication.

# 5 References

1. R2-113-e SONMDT HuNan 2021-01-29-0630 UTC
2. R2-2100703 Report of [Post112-e][852][NR R17 SONMDT] R17 L2M enhancement (vivo) vivo report Rel-17 NR\_ENDC\_SON\_MDT\_enh-Core
3. R2-2100288 Discussion on L2 measurements for split bearers China Telecommunication discussion Rel-17
4. R2-2101417 On layer-2 measurements Ericsson discussion
5. R2-2101698 Discussion on L2M Huawei, HiSilicon