**3GPP TSG RAN2 #116-e R2-21XXXXX**

**Online, 1 – 12 November 2021**

**Agenda Item:**  **8.13.3.1 Immediate MDT enhancements**

**Source: ZTE, Sanechips**

**Title:** **[AT116-e][851][SON/MDT] IMM MDT again (ZTE)**

**Document for: Discussion and Decision**

### 1 Introduction

This is to address the following offline discussion:

* [AT116-e][851][SON/MDT] IMM MDT again (ZTE)

 Scope: focus on proposals 5 and 7 in R2-2110738.

     Intended outcome: Report

      Deadline: 05:00 UTC, Wednesday November 10th

Please add company contact details into the following table to assist communication between delegates.

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###  Discussion

After first SON/MDT online session, following agreements have been achieved on M5/M7 measurements:

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| Agreements3.At least for OAM observability, MN and SN can calculate M5 measurement in the DU respectively when split bearer is used.6. MN and SN can calculate M7 measurement in the DU respectively when split bearer is used.7 From RAN2’s perspective, indication of duplication status is beneficial to be included for M5/M7 measurement in split bearer |

There are still remaining issues on P5 and P7 in R2-2110738, which will be further discussed in this offline.

#### On proposal 5

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| **Proposal 5: RAN2 further discuss enhancements on M5 measurement in split bearer based on following alternatives:****Alt1: the CU or TCE can get the throughput based on the following formula:**$$\frac{sum of the total data in MCG and SCG legs}{transmission duration time in MCG or SCG}$$**Alt2: UE calculates and reports its throughput to NW;****Alt3: Compute the overall throughput at the CU-UP based on following information:****New indications from the DU to the CU to include the measurements mentioned in 5b, 5c and 5d.** |

Based on companies comments during email discussion[Post115-e][895] [2], it is proposed that M5 measurements needs to be enhanced to obtain accurate UE throughput measurements, and methods as listed in above proposal 5 has been proposed. In addition, the new indication indicated in alt3 referred to following information:

* 5b: Burst Size of data transmitted over SN (taking multiple transmission slots)
* 5c: The point in time when the data until the second last piece of data burst TX over SN has been successfully received at the UE
* 5d: The RLC SDU sequence number of packets lost over the Uu interface

According to above observations, rapporteur would like ask the following question:

**Question-1: Which alternatives as listed in proposal 5 do you prefer to adopt for enhanced M5 measurement?**

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| **Company** | **Alt1/2/3/other..** | **Comments** |
| Ericsson | Alt-2 | **Alt-2**UE is the only node that knows how much data has been received/transmitted during the measurement internal AND how long the reception/transmission was active during the measurement period. Thus if any complete throughput needs to be standardized for split bearer, then we support alt-2.**Alt-1 and Alt-3**Regarding Alt-1, the CU is not aware of the denominator of the equation as this information is known only to the respective DUs. Further, **it is impossible for the CU or the TCE to combine the time interval.** Two scenarios are shown below. In the first, the MN transmits for the first 25 ms and the SN transmits from the 30 ms to 55 ms. So, both MN and SN indicate that their transmission interval is 25 ms with **a total transmission duration time of 50ms.** In the second scenario, the transmission interval is still 25 ms but they are transmitted in the same time instace and thus **a total transmission duration time of 25ms.** . Thus unless TCE/CU knows exact start and end times on each cell group, the throughput cannot be computed.SN TransmissionMN transmission5530250SN TransmissionMN transmission250Now, if we consider a scenario wherein within a measurement duration, there are multiple start and end times as shown below (this is the most common way of transmission in a multi user cell), it is extremely cumbersome to combine the two measurements and virutally an extremely large overhead for the network to maintain all these intervals. Thus Alt-1 and Alt-3 are not feasible at all!1000 |
| Qualcomm | Alt-3 | Alt-2 is unacceptable to us. QoS verification is the network responsibility. The measurement can be accurately computed at TCE. Upon sending the proposed in Alt3, TCE can accurately compute it.  |
| CATT | None | The current calculation for M5 can be used for obtain the M5 measurement results of MN and SN. |
| Huawei, HiSilicon | Alt-1 | For Alt-1, if the MN and SN report (e.g., periodical report) the respective transmission duration over a time interval, the TCE/CU will be aware of the overall transmission interval. As to the comments from Ericsson, we think Alt-1 can reduce the signaling between CU/TCE and DUs comparing with the solutions that need all the informations from DUs, and Alt-1 is sufficient to reflect the average throughput.For Alt-2, we are still concerned that the independent M5 measurement cannot reflect the actual throughput regards of two legs. Besides, Alt-2 will cause an overload for the siagnalling interaction.For Alt-3, it brings extra siganllings, with limited accuracy gain. |
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**Rapporteur summary:**

To be added later

#### On proposal 7

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| **Proposal 7: RAN2 study whether enhancements on M7 measurement is needed when split bearer is used.**  |

During email discussion[2], there are some support to enhance M7 measurement while there are also opinions indicating existing M7 is sufficient. Thus, rapporteur would like to ask the following question:

**Question-2: Do you agree enhancement on M7 measurement is needed for split bearers?**

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| **Company** | **Agree/Disagree** | **Comments** |
| Ericsson | Disagree | Average packet loss rate measurements should suffice to calculate the overall expected packet error rate. |
| Qualcomm | Agree | For QoS verification, enhancement is needed.  |
| CATT | Disagree |  |
| Huawei | Agree | Independent M7 measurement is not enough to reflect the actual packet loss rate among two legs. Thus the enhancement is needed. |
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**Rapporteur summary:**

To be added later

Following methods are proposed in email discussion [Post115-e][895] for enhanced M7 measurement:

Alt1:

* For duplication case, M7 could be: MIN (M7 in leg1, M7 in leg2)
* For non-duplication case, M7 could be:

$$\frac{number of loss packets in leg1+number of loss packets in leg2}{number of packets in leg1+number of packets in leg2}$$

Alt2: Introduce new layer-2 measurements to be performed by the CU-UP in association to M7 measurements in split bearer scenarios.

1) Number of duplicated packets during the measurement period

2) Number of non-duplicated packets sent over MCG during the measurement period

3) Number of non-duplicated packets sent over SCG during the measurement period

Alt3: UE calculates and reports M7 to NW;

**Question-3: If your answer to Q2 is agree, please indicate which alternatives you prefer for enhanced M7 measurements?**

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| **Company** | **Alt1/2/3/other..** | **Comments** |
| Ericsson |  | If a single value needs to be produced for M7 in split bearer, then again as in M5 measurement above, we should introduce a UE based solution for at least the Uu interface packet loss rate. **Again UE is the only node that knows which exact packet failed on MN and whether it succeeded in SN or not.** None of the network nodes can compute this in a easy way. |
| Qualcomm | None of the alternatives can accurately compute the measurement | As previously we mentioned, in the duplication scenario, if 1-10 sequence number is transmitted from MN and SN. IF sequence number 2,4 is lost at MN and 8, 9 lost at SN. Then, packet loss should be computed as zero. TCE should be that need to compute it for QoS verification.  |
| Huawei | Alt-1 | We suggest to reduce the interaction between CU/TCE and DUs. During online discussion in the 1st meeting week, RAN2 has agreed that the DUs calculate the M7 measurement respectively when split bearer is used. Therefore in Alt-1, the DU does not send any other information in the non duplication case, and only need report the additional number of loss packets in the duplication case. Therefore Alt-1 can reduce the interaction.For the duplication case, although the Alt-1 is not accurate in the case commented by Qualcomm, we think Alt-1 is sufficient.For Alt-2,the assumption is that there are duplication and non duplication in one measurement period. We need to discuss whether to support this case.For Alt-3, due to the burst transmissions, the Uu interface will suffer a signalling overload. |
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**Rapporteur summary:**

To be added later

### Conclusion

**To be added later.**

###  References

1. R2-116-e SONMDT HuNan 2021-11-03-1615 UTC Session chair (CMCC)
2. R2-2110738 Report of [Post115-e][895][SON/MDT] IMM MDT ZTE Corporation, Sanechips report Rel-17