3GPP TSG-RAN WG2 #117 R2-22xxxxx

eMeeting, 21st February - 3rd March, 2022

Agenda Item: 8.13.4 MDT related Open Issues

Source: Huawei (email rapporteur)

**Title: Report of [AT117e][899][SON/MDT] MDT related Open Issues (Huawei)**

Document for: Discussion and decision

# 1 Introduction

This is report for [AT117e][899].

 [AT117e][899][SON/MDT] MDT related Open Issues (Huawei)

Whether Network should be able to configure different delay threshold for different DRBs.

All the related invited inputs on this proposal should be taken into account.

Other real critical issues from the invited inputs.

Intended outcome: Report for the real final round discussion.

Deadline: 23:55 UTC, Feb, 25th

# 2 Contact Points

Respondents to the email discussion are kindly asked to fill in the following table.

|  |  |  |
| --- | --- | --- |
| Company | Name | Email Address |
| Ericsson | Ali Parichehreh | ali.parichehreh@ericsson.com |
| Qualcomm | Rajeev Kumar | rkum@qti.qualcomm.com |
| Samsung | Sangbum Kim | sb07.kim@samsung.com |
| Huawei, HiSilicon | Jun Chen | jun.chen@huawei.com |
| Apple | Sasha Sirotkin | ssirotkin@apple.com |
| vivo | Boubacar Kimba | kimba@vivo.com |
| CATT | Jie Shi | shijie@catt.cn |
| ZTE | Zhihong QIU | qiu.zhihong@zte.com.cn |
| Sharp | Ningjuan Chang | ningjuan.chang@cn.sharp-world.com |
| OPPO | Liu Yang | liuyangbj@oppo.com |
| CMCC | Fang Xie | Xiefang@chinamobile.com |
| Nokia | Malgorzata Tomala | malgorzata.tomala@nokia.com |

# 3 Discussion

In the report [1], all critical open issues were listed, and the conclusions are copied as below.

It can be seen that category 1 related issues have been discussed in [2] and there is one proposal for more discussions, so it is suggested to discuss it in section 3.1.

For category 2 related issue, it is proposed to discuss it in section 3.2.

For contributions [3] – [10], the issues other than critical issues are also listed in section 3.3. XX

* **Each open issue** should be associated with **suggested treatment/handling**.
	1. **Company input into Pre117-e-offline (i.e. no company tdocs)**
	2. Company tdocs invited.
	3. CR rapporteur handled issue (CR rapporteur will propose resolution as input to next meeting).
	4. Other, e.g. immature area, reference to dependency, unclear status etc.

|  |  |  |
| --- | --- | --- |
| **Features** | **Topic** | **Open issues** |
| Signalling-based logged MDT protection | (1) Details on the indication | Same open issue for inter-PLMN signalling based MDT protection needs to be addressed |
| Logged MDT and early measurements (EMR) | (1) Details on the configuration | FFS on the missing scenario(s) if figured out |
| (2) Details on the measurements and reporting | UE measurement behaviours related to (1) (e.g. We need to clarify that UE logs EM based on the MDT principle) |
| CEF report enhancements | (1) Stored conditions | Figure out conditions of “consecutively” |
| Excess packet delay for NR | (1) Details on the configuration | How the network configures excess packet delay for the UE and relevant ASN.1 impacts |
| (2) Details on the measurements and reporting | How the UE logs and reports excess packet delay, and relevant ASN.1 impacts |
| AreaConfiguration aspects | (1) AreaConfiguration issue | The RAN2 LS R2-2111288 mentions some RAN2 work for Rel-17 |

## 3.1 Whether Network should be able to configure different delay threshold for different DRBs

In the report [2], there is one proposal for more discussions.

To-be-decided proposals:

**To-be-decided proposal 1: Network should be able to configure different delay threshold for different DRBs.**

**Question 1: Do companies agree with the above proposal?**

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| --- | --- | --- |
| **Company** | **Yes/No** | **Comments** |
| Ericsson | Yes | We have the following reasons to allow the network to configure different delay thresholds for different DRBs:1. Different DRBs are used for different slices, and different slices have different delay requirements (URLLC and eMBB)
2. NR spans across multiple SCS from 15KHz to 120KHz for PUSCH, and different DRBs might have different SCS, which means experienced excess delay per DRB can be significantly different. E.g., the delay for a DRB scheduled over 15KHz SCS would be theoretically 8 times greater than the delay for a DRB scheduled over 120KHz SCS.

That is why we believe **one-size-fit-all solution in NR is not sufficient in NR**, because delay thresholds defined for eMBB related DRBs may be totally meaningless for delay threshold required for URLLC related DRBs. So we propose that network configures different delay threshold for different DRBs. |
| Qualcomm | Yes | Agree with Ericsson.  |
| Samsung | Yes |  |
| Huawei, HiSilicon | Yes |  |
| Apple | Yes |  |
| vivo | Yes |  |
| CATT | Yes |  |
| ZTE | Yes |  |
| Sharp  | Yes  |  |
| OPPO | Yes |  |
| CMCC | Yes |  |
| Nokia | See comment | In principle we agree with Ericsson motivation, but we think the proposal is not clear which delay measurement the threshold is to be applied to.There are two UL PDCP delays defined in Rel-17 runnign CR: Average Delay and Excess Packet Delay. In LTE we had one threshold (for Average Delay) as it was per QCI measurement in RRC, now the discussed thresholds seem to relate to Excess Packet Delay (according to Ericsson explanations). Thus, it requires further confirmation. |

**Summary:**

11/12 companies say Yes to Q1. One company would like to clarify the delay measurement.

In the latest TS 38.314 CR, the measurement UL PDCP Excess Packet Delay has been captured, and the above proposal is referring to it.

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

R2-2202706 Running 38.314 CR for R17 layer 2 measurements CMCC CR Rel-17 38.314 16.4.0 0020 - B NR\_ENDC\_SON\_MDT\_enh-Core

4.3.1.e UL PDCP Excess Packet Delay per DRB

The objective of this measurement performed by UE is to measure Excess Packet Delay in Layer PDCP for QoS verification of MDT.

Protocol Layer: PDCP

|  |  |
| --- | --- |
| **Definition** | PDCP Excess Packet Delay in the UL per DRB. It represents the ratio of packets in UL per DRB exceeding the configured delay threshold among the UL PDCP SDUs received. The delay for each packet is calculated from packet arrival at PDCP upper SAP until the UL grant to transmit the packet is available, which has included the delay the UE gets resources granted (from sending SR/RACH to get the first grant). The measurement is done separately per DRB.Detailed Definition:$$M(T,drbid)=\frac{nExcess(T,drbid)}{nTotal(T,drbid)}$$$tULdelay(i,drbid)=tDeliv(i,drbid)-tArrival(i,drbid)$,whereexplanations can be found in the table 4.3.1.e-1 below. |

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

**Agreeable proposal 1: For UL PDCP Excess Packet Delay (related to section 4.3.1.e in TS 38.314 CR), network should be able to configure different delay threshold for different DRBs.**

## 3.2 EMR discussion

In CATT [4], it is proposed:

**Proposal 1: It is up to network implementation to configure the *earlyMeasIndication-r17* and *AreaConfig* and/or *InterFreqTargetInfo in loggedMeasurementConfiguration*.**

**Proposal 2: The UE will perform early measurements logging in logged MDT report according to the following principles:**

* **If only *earlyMeasIndication-r17* isconfigured in *loggedMeasurementConfiguration* (i.e. no early measurement frequencies in *loggedMeasurementConfiguration*), UE logs early measurement results based on early measurement performance principles in logged MDT measurement report.**
* **If early measurement frequencies is configured in *loggedMeasurementConfiguration*, UE logs early measurement results based on logged MDT measurement performance principles in logged MDT measurement report.**

In ZTE [6], it is proposed:

**Proposal 1: If both earlyMeasIndication-r17 is included and areaConfiguration including early measurement frequencies is configured, UE includes EMR of frequencies that is signalled in both SIB5 and interFreqTargetInfo in logged MDT.**

**Proposal 2: If only earlyMeasIndication is configured then UE is expected to include all available early measurement results on frequencies configured by NW for early measurement.**

In Huawei [7], it is proposed:

**Proposal 1: Both Option1 and Option2 are not preferred. The OAM only needs to decide whether to send *earlyMeasIndication-r17* to the UE.**

**Proposal 2: For measurement results combination, choosing the available EMR results with the latest time stamp from the logged MDT logging time.**

**Proposal 3: Ignoring the quality threshold when combing EMR results into logged MDT results.**

**Proposal 4: When EM and logged MDT have the measurement results for the same frequencies, always in prior to log the results from the logged MDT.**

In Ericsson [8], it is proposed:

* RAN2 agree that if EM results are already available for frequencies configured as part of *InterFreqTargetInfo* and if the *earlyMeasIndication* is configured by the OAM, the UE logs EM for those frequencies in the MDT report.
* OAM should be able to configure EMR frequencies (sync raster ARFCN values and channel raster ARFCN values) as part of the *InterFreqTargetInfo* to indicate the neighbor frequencies that the UE logs in the logged MDT report (The UE logs these measurements in the logged MDT report only if the RAN node has configured the corresponding EMR frequency in its EMR configuration).

In Nokia [10], it is proposed:

**Proposal 1: *AreaConfiguration-r17* with *AreaConfig* and *InterFreqTargetInfo* can be configured independently from *earlyMeasIndication-r17.***

**Proposal 2: *earlyMeasIndication-r17* shouldn’t be configured independently.If *earlyMeasIndication-r17* is configured, the *AreaConfiguration-r17* with *AreaConfig* and *InterFreqTargetInfo* needs to be present too in L*oggedMeasurementConfiguration*.**

Based on the above proposals, a summary of solutions is made as below. It is the rapporteur’s understanding that no extra measurement requirements will be introduced for all listed solutions.

**Solution A:**

For the flag earlyMeasIndication-r17:

* (1) if it is not sent from RAN to UE, the UE is not allowed to log EM in logged MDT report (following legacy logged MDT behaviours).
* (2) If it is sent, the UE behaviours are:
	+ (2a) If InterFreqTargetInfo is present:
		- (2a-1) If some frequencies are included in **both** InterFreqTargetInfo and early measurement frequencies i.e., measIdleConfig, the UE performs EM for those frequencies and put the EM results in logged MDT report
		- (2a-2) If some frequencies are **only** included in InterFreqTargetInfo (but not in early measurement frequencies i.e., measIdleConfig), the UE performs legacy logged MDT for those frequencies
		- (2a-3) If some frequencies are **only** included in early measurement frequencies i.e., measIdleConfig (but not in InterFreqTargetInfo), the UE performs legacy EM for those frequencies, and will not put EM results in legacy logged MDT
	+ (2b) Else:
		- The UE performs EM following EM configuration, and put EM results in logged MDT report
		- Rapp’s note: it seems that 2b is not discussed in companies’ contributions, so it is good to clarify it.
* (3) OAM should be able to configure EMR frequencies as part of the InterFreqTargetInfo to indicate the neighbor frequencies that the UE logs in the logged MDT report. Thus once RAN2 is to make a decision on solution A, SA5 needs to be informed

**Solution B:**

The OAM only needs to decide whether to send earlyMeasIndication-r17 to the UE. For measurement results combination, the UE chooses the available EMR results with the latest time stamp from the logged MDT logging time. When EM and logged MDT have the measurement results for the same frequencies, always in prior to log the results from the logged MDT.

For this solution, the configurations of logged MDT and EMR are independent and the OAM does not need to configure EMR frequencies as part of InterFreqTargetInfo.

**Question 2: Which of solutions is preferred (between solution A and solution B)? (for solution A, bullet 2b will be discussed in the next question)**

|  |  |  |
| --- | --- | --- |
| **Company** | **Preferred solution** | **Comments** |
| Ericsson  | A | Solution A gives a better observability to the OAM in terms of measurements not only on **sync raster frequencies** (collecting more accurate measurements if EM are available for such frequencies) but also on the **channel raster frequencies** that are not available/confgured in SIB4 and SIB5.  |
| Qualcomm | A | EM frequency can be included in InterFreqTargetInfo only if earlyMeasIndication-r17 is configured.  |
| Samsung | A |  |
| Huawei, HiSilicon | B (can be fine with A) | Solution B has few impacts to OAM and RAN-OAM interactions, so it is preferred. However, if majority of companies are fine with Solution A, we can be fine. |
| Apple | B | Slight preference for B, but can accept A if that’s the majority view |
| vivo | A |  |
| CATT | A  | We are fine with Option A, but a question is in 2a-1, for frequencies are included in both InterFreqTargetInfo and early measurement frequencies, does the UE perform to measure and report according to the EM measurement performance principles, or according to the MDT measurement performance principles? Based on RAN2#116e meeting agreeement, we understand that the UE performs to measure and report in 2a-1 according to the MDT measurement performance principles.**RAN2#116 e meeting agreement:**1 Extended LoggedMeasurementConfiguration with AreaConfig and/or InterFreqTargetInfo, implies the Logged MDT reports are provided according to legacy MDT performance measurements.  |
| ZTE | A |  |
| Sharp  | A |  |
| OPPO | B | “The OAM only needs to decide whether to send earlyMeasIndication-r17 to the UE” is more clear to the UE to decide whether or not it needs to record down the early measurement results. |
| CMCC | A |  |
| Nokia | None unless we agree some modifications | We would like to echo back the agreement quoted by CMCC and one more:RAN2#116-e meeting agreements:Extended LoggedMeasurementConfiguration with AreaConfig and/or InterFreqTargetInfo, implies the Logged MDT reports are provided according to legacy MDT performance measurements. 2 LoggedMeasurementConfiguration is extended with a flag to indicate if an early measurement/idle mode configuration has relevance for logged measurement purposes.RAN2#116bis-e meeting agreements:6 For setting EMR results in logged MDT results： − No impact on the ASN.1 but the neighbour cell measurements included in the logged MDT results (measResultNeighCells) contains both EMR frequencies measurements (amongst measIdleCarrierListNR and/or measIdleCarrierListEUTRA) and cell reselection frequencies measurements (included in SIB4 and SIB5). In that terms, for solution A: steps 2a-1 and 2b need to be clarified what EMR result mean (in our understanding logging of measurement results according to legacy MDT, but for the EMR frequencies). Otherwise, the previous agreement is violated?Thus, the solution A should always state: “ the UE performs measurement results for the frequencies from configuration and put the results in logged MDT report” Instead of “performs EM and put put EM results” as this isn’t clear to us, whether according to RAN2#116bis agreement.We believe the OAM does not have to ensure the alignment of the frequencies, as this is introducing too much inter-depenedency of the two features (EMR and MDT) to OAM.In that terms, solution B is ok, but the requirements on generating the measurement results with reference to time stamp are not clear.In solution A, step (1) is ok, but in (2) the steps 2a-2b could be simplified to instruct the UE to always act on the provided Logged MDT configuration.However, it should be FFS: how to align frequencies from measIdleConfig and interFreqTargetInfo if the EMR flag is present (e.g. whether RAN or UE should teke the action) |

**Summary:**

8/12 companies support solution A, and 2 companies can be fine with solution A.

Some companies indicate that “performs EM and put EM results” is unclear in solution A, and some suggestions are provided. From the rapporteur’s point of view, “performs EM and put put EM results” (named **Solution A1**) means the following:

* For frequencies indicated in 2a-1 and 2b, the UE performs measurements following EMR measurement performance principle. And then, the UE will store the cell measurements in logged MDT report. In other words, it is not expected to let UE put EM report (MeasResultIdleEUTRA/MeasResultsPerCellIdleEUTRA) in logged MDT report
* For other frequencies, legacy MDT measurements are applied

For solution A1, one major benefit is that more accurate measurements can be got if EM are available for such

frequencies. The solution can work because the UE doing logged MDT should as much as possible rely on the measurements that are available in the UE (defined in TS 37.320), and the UE performing EMR can provide such measurements (e.g. the text as below).

|  |
| --- |
| 5.7.8.2a Performing measurements*<Partially omitted>*2> if the *VarMeasIdleConfig* includes the *measIdleCarrierListNR* and the SIB1 contains *idleModeMeasurementsNR*:3> for each entry in *measIdleCarrierListNR* within *VarMeasIdleConfig* that contains *ssb-MeasConfig*:4> if UE supports carrier aggregation or NR-DC between serving carrier and the carrier frequency and subcarrier spacing indicated by *carrierFreq* and *ssbSubCarrierSpacing* within the corresponding entry:5> perform measurements in the carrier frequency and subcarrier spacing indicated by *carrierFreq* and *ssbSubCarrierSpacing* within the corresponding entry; |

As a comparision, the other alternative “performs logged MDT and put logged MDT results” (named **Solution A2**) means the following:

* For all frequencies indicated in solution A, the UE always performs logged MDT measurement performance principle

For solution A1 and A2, there are some supports and also some concerns, so it is proposed RAN2 to discuss them:

**Proposal 1:**

**if the earlyMeasIndication-r17 is not included, the UE is not allowed to log EM in logged MDT report (following legacy logged MDT behaviours).**

**if the earlyMeasIndication-r17 is included, for the following frequencies:**

* **If interFreqTargetInfo is included, for frequencies included in both interFreqTargetInfo and EMR config**
* **If interFreqTargetInfo is not included, for frequencies included in EMR config**
* **For inter-RAT related frequencies included in EMR config**

**Regarding how the UE performs measurements for the above frequencies and stores the results, the following solutions are proposed for discussions:**

**Solution A1: the UE performs measurements for the frequencies following EMR measurement performance principle and store the cell measurements in logged MDT report**

**Solution A2: the UE performs measurements for the frequencies following logged MDT measurement performance principle and store the cell measurements in logged MDT report**

**For both solutions, the UE performs measuremens for other frequencies (indicated in logged MDT config) following logged MDT measurement performance principle, and store the cell measurements in logged MDT report**

**Question 3: For bullet 2b in solution A, do companies agree with the above UE behaviour? If not, what do companies would like to specify/clarify?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/No** | **Comments** |
| Ericsson  | Yes | We think when *InterFreqTargetInfo* is not present and *earlyMeasIndication* is configured, it is reasonable to log the existing EM (if available i.e., configured as part of measIdleConfig). In fact, it is not an optimal implementation that UE performs MDT measurements (with lower accuracy) when EM are available for the same frequencies (which are performed at a higher accuracy according to the RAN4 requirements). Hence when the *earlyMeasIndication* is configured and *InterFreqTargetInfo* is absent, for the frequencies that UE performs EM, UE logs the EM in the MDT report. This (EM) gives more accurate measurements to the OAM.  |
| Qualcomm | Yes |  |
| Samsung | Yes |  |
| Huawei, HiSilicon | Yes |  |
| vivo | Yes |  |
| CATT | Yes |  |
| ZTE | Yes |  |
| Sharp  | Yes  |  |
| CMCC | Yes |  |
| Nokia | No | We are fine to state that the UE should follow frequencies from EMR configuration, but instead of “performs EM and put put EM results” awe should state:  “ the UE performs measurement results for the frequencies from configuration and put the results in logged MDT report” To follow the agreement:No impact on the ASN.1 but the neighbour cell measurements included in the logged MDT results (measResultNeighCells) contains both EMR frequencies measurements |
|  |  |  |

**Summary:**

9/10 companies say Yes, and 1 company have a differenet understanding. The above summary proposal 1 has covered the discussion.

One company [7] indicates that ignoring the quality threshold when combing EMR results into logged MDT results. The reasons are as below:

In addition, we need to clarify that UE logs EM based on the MDT principle e.g., qualityThreshold that is set as part of measIdleConfig should not be applied when logging EM as part of MDT report. For example, if UE performs measurement on frequency F1 (which is an EM frequency) and the RSRP value is X= -110dbm that is less than qualityThreshod=-105 (configured as part of MeasIdleConfig), although the UE does not report the value X as part of EMR (if the UE comes to connected at this point in time), it logs the value X for frequency F1 as part of MDT report.

**Question 4: Do companies agree that when logging EM as part of MDT reports, the qualitythreshold in measIdleConfig should not be applied?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/No** | **Comments** |
| Ericsson | Yes |  |
| Qualcomm | No strong view | However, I believe it should be okay. |
| Samsung | Yes but | We wonder whether it also applies to bullet 2b in Q3.  |
| Huawei, HiSilicon | Yes |  |
| Apple | Yes |  |
| vivo | Yes |  |
| CATT | Yes with comment | For 2a in Q2, the UE should perform the measurement and reporting according to the MDT measurement performance principles as we mentioned in Q2.For 2b in Q2, we think it is fine to not apply qualitythreshold in measIdleConfig when logging EM as part of MDT reports, which can provide more measurement information to OAM. |
| ZTE | Yes |  |
| Sharp  | Yes  |  |
| CMCC | Yes |  |
| Nokia | Yes | To follow the agreement:No impact on the ASN.1 but the neighbour cell measurements included in the logged MDT results (measResultNeighCells) contains both EMR frequencies measurements |

**Summary:**

10/11 companies say Yes. Some companies indicate that Q4 is related to Q2 because Q4 is applicable when the UE performs measurements following EMR measurement performance principle (solution A1), otherwise, the parameter is not involved.

1 company do not have no strong view.

**Agreeable proposal 2: If solution A1 is selected, the qualitythreshold in measIdleConfig should not be applied.**

**Question 5: If companies have other comments that are not covered by the above questions and are essential for EMR discussion, please provide your comment into the following table.**

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/No** | **Comments** |
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## 3.3 Other discussions

### 3.3.1 About on-demand SI

In [3], it is proposed:

Observation: All companies deemed that the information that whether the on-demand SI request procedure was successful or not is needed, if the successful on-demand SI request procedure scenario is supported.

Proposal: UE reports that whether the on-demand SI acquiring was successful or not.

[Rapp] 6 companies co-sign the contribution, so it is proposed to it.

### 3.3.2 MDT and QoE alignment

[Rapp] [5] should be related to NR QoE topic, and it seems to be no impacts to Rel-17 SON and MDT for the contribution.

### 3.3.3 Override protection for sig-logged MDT

In [8], it is proposed:

**Proposal 3 Concerning signaling based MDT protection flag (sigLogMeasConfigAvailable):**

**a. The UE sets the to sigLogMeasConfigAvailable to TRUE when the UE has valid signalling based MDT configuration i.e., T330 is still running.**

**b. The UE sets the sigLogMeasConfigAvailable to FALSE when the UE has signalling based MDT related report contents but T330 has expired (i.e., there is no signalling based MDT configuration).**

**c. The UE does not include the sigLogMeasConfigAvailable flag in all other cases.**

**Proposal 4 For the sake of protection of signaling based MDT configuration, the UE sends the signaling based MDT availability flag (sigLogMeasConfigAvailable flag) to a cell belonging to a PLMN that is not in the plmn-IdentityList.**

**Proposal 5 Override protection mechanism for the signalling based MDT should not be dependent to the RAT or PLMN identity.**

[Rapp] P3, P4 and P5 could be discussed during MDT 38.331 CR discussion.

### 3.3.4 Multiple CEF reports

In [8], it is proposed:

**Proposal 6 UE logs one entry per consecutive failures occurring in the same cell in a row. perRAInfoList is collected for the last failure in a row, and numberOfConnFail indicates the number of failures in a row.**

[Rapp] P6 could be discussed during MDT 38.331 CR discussion.

### 3.3.5 Configuration of logged MDT in DC

In [8], it is proposed:

**Proposal 7 RAN2 liaise RAN3 that not introducing SN configuration in DC scenarios is applicable to all the DC scenarios such as EN-DC, NGEN-DC, NE-DC and NR-DC.**

In [8], it is indicated that the topic is under discussion in RAN3 pending confirmation from RAN2 we propose that RAN2 liaise RAN3 highlighting that the agreement is applicable to all the DC scenarios. A draft of an LS to RAN3 is provided in the Annex of the paper.

[Rapp] It is proposed to discuss the above proposal 7 so that RAN3 can timely progress on their parts.

### 3.3.6 On immediate MDT measurements

In [9], it is proposed:

[Proposal 1 For M6 measurements to allow the OAM to calculate total RAN delay, CU-UP forwards the duplication information to the TCE. The information contains (granularity is per DRB): 1) Number of PDCP duplicated packets sent to the UE during measurement period. 2) Number of non-duplicated packets sent through the MCG during measurement period. 3) Number of non-duplicated packets sent through the SCG during measurement period.](#_Toc95723856)

[Proposal 2 New IE is introduced in 38.331 to enable the RAN node to configure the UE with excess delay measurement configuration.](#_Toc95723857)

[Proposal 3 Network should be able to configure different *delayThreshold* for different DRBs.](#_Toc95723858)

[Proposal 4 RAN2 agree to use LTE excess delay threshold values beside already agreed values. So, the range of the delay thresholds is {0.25ms, 0.5ms, 1ms, 5ms, 10ms, 20ms, 30ms, 40ms, 50ms, 60ms, 70ms, 80ms, 90ms, 100ms, 150ms, 300ms, 500ms, 750ms}.](#_Toc95723859)

[Proposal 5 Given the time limitation, for definition of excess delay, its configuration and reporting for NR packets, RAN2 focuses on NR-SA and NR-DC scenarios.](#_Toc95723860)

[Proposal 6 In NR-DC, excess delay measurement IE configuration follows the same principle as D1 measurement configuration.](#_Toc95723861)

[Proposal 7 Reporting of the Excess delay measurement should follow LTE principles. i.e., a) Content of the Excess Delay measurement report is similar to LTE excess delay measurement report. b) Node that configures UE with Excess Delay measurements receives the report from the UE.](#_Toc95723862)

[Rapp] P3 has been covered by Q1. P2, P4, P5, P6 and P7 can be discussed in MDT 38.331 CR discussion.

For P1, it is the rapporteur’s understanding that the proposal is not part of open issue list for R17 MDT [1], so it might be de-prioritized.

### 3.3.7 Summary

**Summary of section 3.3:**

* **Some proposals can be discussed in MDT 38.331 CR discussion**
* **Some proposals may not be treated or de-prioritized**
* **2 proposals are suggested for more discussions. Even if both are not listed in the MDT open issue list, the rapporteur thinks it is good to collect companies’ opinions and then try to make a decision**

**Proposal: UE reports that whether the on-demand SI acquiring was successful or not. [3]**

**Question 6: Do companies agree with the above proposal?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/No** | **Comments** |
| Ericsson | Yes |  |
| Qualcomm | Yes |  |
| Samsung | Yes |  |
| Huawei, HiSilicon | Yes |  |
| Apple | Yes |  |
| vivo | Yes |  |
| CATT | Yes |  |
| ZTE | Yes |  |
| Sharp  | Yes  |  |
| OPPO | Yes |  |
| CMCC | Yes |  |

**Summary:**

11/11 companies say Yes.

**Agreeable proposal 3: UE reports that whether the on-demand SI acquiring was successful or not.**

**Proposal 7 RAN2 liaise RAN3 that not introducing SN configuration in DC scenarios is applicable to all the DC scenarios such as EN-DC, NGEN-DC, NE-DC and NR-DC. [8]**

**Question 7: Do companies agree with the above proposal?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/No** | **Comments** |
| Ericsson | Yes |  |
| Qualcomm | Yes |  |
| Samsung | Yes |  |
| Huawei, HiSilicon | Yes |  |
| Apple | Yes |  |
| vivo | Yes |  |
| CATT | Yes |  |
| Sharp  | Yes  |  |
| OPPO | Yes |  |
| CMCC | Yes |  |
| Nokia | yes |  |

**Summary:**

11/11 companies say Yes.

**Agreeable proposal 4: RAN2 liaise RAN3 that not introducing SN configuration in DC scenarios is applicable to all the DC scenarios such as EN-DC, NGEN-DC, NE-DC and NR-DC. ([8], Ericsson can handle the LS)**

**Question 8: For proposals/contributions in section 3.3, do companies have comments on them (e.g. some proposals really need to be discussed and concluded)?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/No** | **Comments** |
| Ericsson | Yes | We think the following proposal is needed to be discussed. Otherwise OAM would not be able to calculate the total RAN delay in dual connectivity with split bearer when PDCP duplication is enabled only for some of the packets in a delay measurement window. [Proposal 1 For M6 measurements to allow the OAM to calculate total RAN delay, CU-UP forwards the duplication information to the TCE. The information contains (granularity is per DRB): 1) Number of PDCP duplicated packets sent to the UE during measurement period. 2) Number of non-duplicated packets sent through the MCG during measurement period. 3) Number of non-duplicated packets sent through the SCG during measurement period.](#_Toc95723856)Not addressing this issue means that the problems we have in Rel17 (OAM is not able to calculate total RAN delay in case PDCP duplication is enabled for some packets during the delay measurement window) will still remain...so we will have a release where delay measurements will be ambiguous. |
| Qualcomm |  | For M6 mesurements, we made the following agreements in RAN2#113:* For QoS monitoring related delay reporting to CN, the minimum value between two legs is defined as the total delay measurement M6 over MCG/SCG for split bearers WITH PDCP duplication
* 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

According to RAN2 agreement, CU-CP can report M6 measurements for duplicated packets (X) and M6 measurements for non-duplicated packet (Y) per DRB per measurement period. We can have two choice for total delay measurements:* M6 measurements for duplicated packets and non-duplicated packets per DRB per measurement period is sufficient.
* CU-CP additionally forwards number of duplicated and non-duplicated packets per DRB per measurement period. No need to separately report number of non-duplicated packet sent over MCG and SCG.
 |
| Huawei, HiSilicon | RAN3 discussions? | In the latest RAN3 minutes (as below), it seems that RAN3 has discussed the same topic and will make final decisions. So we wonder whether Q8 can be left for RAN3 decisions or not.<https://www.3gpp.org/ftp/tsg_ran/WG3_Iu/TSGR3_115-e/Inbox/Drafts/Chairs_Notes/RAN3_115-e_agenda_202202240130.zip>10.4. Support for L2 Measurements*If needed**In cooperation with RAN2*From RAN3 point of view, it is feasible that D3 is re-used to reflect the DL delay on F1-U/X2/Xn, D2.3 is re-used to reflect the UL delay on F1-U/X2/Xn.No RAN3 spec impact; it is up to RAN2 to update their specs accordingly.*RAN3#114bis-e:**Down select in solution 1 and solution 2a.* *Solution 1: CU-UP reports the total RAN part of the packet delay to the TCE**Solution 2: Sending individual delay components to TCE**2a: sending further detailed measurements to TCE for M6 calculation**Number of PDCP PDUs sent via MN or SN within a measurement period, when PDCP duplication is enabled.**Number of PDCP PDUs sent over MN within a measurement period, when the PDCP duplication is not enabled.**Number of PDCP PDUs sent over SN within a measurement period, when the PDCP duplication is not enabled.**Whether case 3 is covered by solution 1 or 2a is FFS.**To be continued...* |
| Nokia | OAM to calculate total delay is RAN3 decision | We share Huawei understanding. Decision about provision or calculation of the total delay to OAM concerns RAN3 signalling, thus RAN3 is in a better position to decide whether M6 reporting should be per entity or only by CU-UP (as they discuss). The same on any sigballing from CP-UP towards OAM (Qualcomm proposal) |
|  |  |  |
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**Summary:**

Ericsson’s feedbacks:

Ericsson proposes to agree that solutions regarding assistance information for M6 measurements signalled from RAN to TCE is under RAN3 domain. Based on that, RAN2 does not need to duplicate the discussion. RAN2 can wait for RAN3 to converge and then take RAN3 decision into account instead of de-prioritization of the topic.

So RAN2 just waits for RAN3 progress regarding M6 measurements.

# 4 Conclusions

Based on the discussions above, the following proposals are made:

**Agreeable proposals:**

**Agreeable proposal 1: For UL PDCP Excess Packet Delay (related to section 4.3.1.e in TS 38.314 CR), network should be able to configure different delay threshold for different DRBs.**

**Agreeable proposal 2: If solution A1 is selected, the qualitythreshold in measIdleConfig should not be applied.**

**Agreeable proposal 3: UE reports that whether the on-demand SI acquiring was successful or not.**

**Agreeable proposal 4: RAN2 liaise RAN3 that not introducing SN configuration in DC scenarios is applicable to all the DC scenarios such as EN-DC, NGEN-DC, NE-DC and NR-DC. ([8], Ericsson can handle the LS)**

**Proposals for more dicussions:**

**Proposal 1:**

**if the earlyMeasIndication-r17 is not included, the UE is not allowed to log EM in logged MDT report (following legacy logged MDT behaviours).**

**if the earlyMeasIndication-r17 is included, for the following frequencies:**

* **If interFreqTargetInfo is included, for frequencies included in both interFreqTargetInfo and EMR config**
* **If interFreqTargetInfo is not included, for frequencies included in EMR config**
* **For inter-RAT related frequencies included in EMR config**

**Regarding how the UE performs measurements for the above frequencies and stores the results, the following solutions are proposed for discussions:**

**Solution A1: the UE performs measurements for the frequencies following EMR measurement performance principle and store the cell measurements in logged MDT report**

**Solution A2: the UE performs measurements for the frequencies following logged MDT measurement performance principle and store the cell measurements in logged MDT report**

**For both solutions, the UE performs measuremens for other frequencies (indicated in logged MDT config) following logged MDT measurement performance principle, and store the cell measurements in logged MDT report**

# 5 References

1. R2-2201986 MDT related open issue list (Huawei) Huawei
2. R2-2203026 Pre-meeting discussion report for R17 MDT Huawei discussion Rel-17 NR\_ENDC\_SON\_MDT\_enh-Core Late
3. R2-2202733 Leftovers for on-demand SI CMCC, Ericsson, Samsung, CATT, ZTE, Huawei discussion Rel-17 NR\_ENDC\_SON\_MDT\_enh-Core
4. R2-2202803 Discussion on MDT Related Open Issues CATT discussion Rel-17 NR\_ENDC\_SON\_MDT\_enh-Core
5. R2-2202935 Support of MDT and QoE alignment Qualcomm Incorporated discussion NR\_QoE\_enh
6. R2-2202974 Consideration on MDT open issues ZTE Corporation, Sanechips discussion Rel-17
7. R2-2203027 Discussion on MDT related open issues Huawei, HiSilicon discussion Rel-17 NR\_ENDC\_SON\_MDT\_enh-Core
8. R2-2203329 Discussion on logged MDT open issues Ericsson discussion
9. R2-2203331 On Immediate MDT measurements Ericsson, CMCC discussion
10. R2-2203396 Early measurements logging in MDT Nokia, Nokia Shanghai Bell discussion Rel-17 NR\_ENDC\_SON\_MDT\_enh-Core

# 6 Annex – logged measurement results and EM results in TS 38.331

*measIdleCarrierListEUTRA*

*measIdleCarrierListNR*

-- ASN1START

-- TAG-MEASIDLECONFIG-START

MeasIdleConfigSIB-r16 ::= SEQUENCE {

 measIdleCarrierListNR-r16 SEQUENCE (SIZE (1..maxFreqIdle-r16)) OF MeasIdleCarrierNR-r16 OPTIONAL, -- Need S

 measIdleCarrierListEUTRA-r16 SEQUENCE (SIZE (1..maxFreqIdle-r16)) OF MeasIdleCarrierEUTRA-r16 OPTIONAL, -- Need S

 ...

}

MeasIdleConfigDedicated-r16 ::= SEQUENCE {

 measIdleCarrierListNR-r16 SEQUENCE (SIZE (1..maxFreqIdle-r16)) OF MeasIdleCarrierNR-r16 OPTIONAL, -- Need N

 measIdleCarrierListEUTRA-r16 SEQUENCE (SIZE (1..maxFreqIdle-r16)) OF MeasIdleCarrierEUTRA-r16 OPTIONAL, -- Need N

 measIdleDuration-r16 ENUMERATED{sec10, sec30, sec60, sec120, sec180, sec240, sec300, spare},

 validityAreaList-r16 ValidityAreaList-r16 OPTIONAL, -- Need N

 ...

}

– *SIB11*

*SIB11* contains information related to idle/inactive measurements.

***SIB11* information element**

-- ASN1START

-- TAG-SIB11-START

SIB11-r16 ::= SEQUENCE {

 measIdleConfigSIB-r16 MeasIdleConfigSIB-r16 OPTIONAL, -- Need S

 lateNonCriticalExtension OCTET STRING OPTIONAL,

 ...

}

-- TAG-SIB11-STOP

-- ASN1STOP

| ***SIB11* field descriptions** |
| --- |
| ***measIdleConfigSIB***Indicates measurement configuration to be stored and used by the UE while in RRC\_IDLE or RRC\_INACTIVE. |

– *VarMeasIdleReport*

The UE variable *VarMeasIdleReport* includes the logged measurements information.

***VarMeasIdleReport UE* variable**

-- ASN1START

-- TAG-VARMEASIDLEREPORT-START

VarMeasIdleReport-r16 ::= SEQUENCE {

 measReportIdleNR-r16 MeasResultIdleNR-r16 OPTIONAL,

 measReportIdleEUTRA-r16 MeasResultIdleEUTRA-r16 OPTIONAL

}

-- TAG-VARMEASIDLEREPORT-STOP

-- ASN1STOP

*idleMeasAvailable*

UEInformationResponse-r16-IEs ::= SEQUENCE {

 measResultIdleEUTRA-r16 MeasResultIdleEUTRA-r16 OPTIONAL,

 measResultIdleNR-r16 MeasResultIdleNR-r16 OPTIONAL,

 logMeasReport-r16 LogMeasReport-r16 OPTIONAL,

 connEstFailReport-r16 ConnEstFailReport-r16 OPTIONAL,

 ra-ReportList-r16 RA-ReportList-r16 OPTIONAL,

 rlf-Report-r16 RLF-Report-r16 OPTIONAL,

 mobilityHistoryReport-r16 MobilityHistoryReport-r16 OPTIONAL,

 lateNonCriticalExtension OCTET STRING OPTIONAL,

 nonCriticalExtension SEQUENCE {} OPTIONAL

}

LogMeasInfoList-r16 ::= SEQUENCE (SIZE (1..maxLogMeasReport-r16)) OF LogMeasInfo-r16

LogMeasInfo-r16 ::= SEQUENCE {

 locationInfo-r16 LocationInfo-r16 OPTIONAL,

 relativeTimeStamp-r16 INTEGER (0..7200),

 servCellIdentity-r16 CGI-Info-Logging-r16 OPTIONAL,

 measResultServingCell-r16 MeasResultServingCell-r16 OPTIONAL,

 measResultNeighCells-r16 SEQUENCE {

 measResultNeighCellListNR MeasResultListLogging2NR-r16 OPTIONAL,

 measResultNeighCellListEUTRA MeasResultList2EUTRA-r16 OPTIONAL

 },

 anyCellSelectionDetected-r16 ENUMERATED {true} OPTIONAL,

 ...

}

MeasResultLogging2NR-r16 ::= SEQUENCE {

 carrierFreq-r16 ARFCN-ValueNR,

 measResultListLoggingNR-r16 MeasResultListLoggingNR-r16

}

MeasResultListLoggingNR-r16 ::= SEQUENCE (SIZE (1..maxCellReport)) OF MeasResultLoggingNR-r16

MeasResultListLogging2NR-r16 ::= SEQUENCE(SIZE (1..maxFreq)) OF MeasResultLogging2NR-r16

MeasResultLogging2NR-r16 ::= SEQUENCE {

 carrierFreq-r16 ARFCN-ValueNR,

 measResultListLoggingNR-r16 MeasResultListLoggingNR-r16

}

MeasResultLoggingNR-r16 ::= SEQUENCE {

 physCellId-r16 PhysCellId,

 resultsSSB-Cell-r16 MeasQuantityResults,

 numberOfGoodSSB-r16 INTEGER (1..maxNrofSSBs-r16) OPTIONAL

}

MeasResult2EUTRA-r16 ::= SEQUENCE {

 carrierFreq-r16 ARFCN-ValueEUTRA,

 measResultList-r16 MeasResultListEUTRA

}

MeasResultListEUTRA ::= SEQUENCE (SIZE (1..maxCellReport)) OF MeasResultEUTRA

MeasResultEUTRA ::= SEQUENCE {

 eutra-PhysCellId PhysCellId,

 measResult MeasQuantityResultsEUTRA,

 cgi-Info CGI-InfoEUTRA OPTIONAL,

 ...

}

MultiBandInfoListEUTRA ::= SEQUENCE (SIZE (1..maxMultiBands)) OF FreqBandIndicatorEUTRA

MeasQuantityResults ::= SEQUENCE {

 rsrp RSRP-Range OPTIONAL,

 rsrq RSRQ-Range OPTIONAL,

 sinr SINR-Range OPTIONAL

}

MeasQuantityResultsEUTRA ::= SEQUENCE {

 rsrp RSRP-RangeEUTRA OPTIONAL,

 rsrq RSRQ-RangeEUTRA OPTIONAL,

 sinr SINR-RangeEUTRA OPTIONAL

}

MeasResultIdleNR-r16 ::= SEQUENCE {

 measResultServingCell-r16 SEQUENCE {

 rsrp-Result-r16 RSRP-Range OPTIONAL,

 rsrq-Result-r16 RSRQ-Range OPTIONAL,

 resultsSSB-Indexes-r16 ResultsPerSSB-IndexList-r16 OPTIONAL

 },

 measResultsPerCarrierListIdleNR-r16 SEQUENCE (SIZE (1.. maxFreqIdle-r16)) OF MeasResultsPerCarrierIdleNR-r16 OPTIONAL,

 ...

}

MeasResultsPerCarrierIdleNR-r16 ::= SEQUENCE {

 carrierFreq-r16 ARFCN-ValueNR,

 measResultsPerCellListIdleNR-r16 SEQUENCE (SIZE (1..maxCellMeasIdle-r16)) OF MeasResultsPerCellIdleNR-r16,

 ...

}

MeasResultsPerCellIdleNR-r16 ::= SEQUENCE {

 physCellId-r16 PhysCellId,

 measIdleResultNR-r16 SEQUENCE {

 rsrp-Result-r16 RSRP-Range OPTIONAL,

 rsrq-Result-r16 RSRQ-Range OPTIONAL,

 resultsSSB-Indexes-r16 ResultsPerSSB-IndexList-r16 OPTIONAL

 },

 ...

}

MeasResultIdleEUTRA-r16 ::= SEQUENCE {

 measResultsPerCarrierListIdleEUTRA-r16 SEQUENCE (SIZE (1.. maxFreqIdle-r16)) OF MeasResultsPerCarrierIdleEUTRA-r16,

 ...

}

MeasResultsPerCarrierIdleEUTRA-r16 ::= SEQUENCE {

 carrierFreqEUTRA-r16 ARFCN-ValueEUTRA,

 measResultsPerCellListIdleEUTRA-r16 SEQUENCE (SIZE (1..maxCellMeasIdle-r16)) OF MeasResultsPerCellIdleEUTRA-r16,

 ...

}

MeasResultsPerCellIdleEUTRA-r16 ::= SEQUENCE {

 eutra-PhysCellId-r16 EUTRA-PhysCellId,

 measIdleResultEUTRA-r16 SEQUENCE {

 rsrp-ResultEUTRA-r16 RSRP-RangeEUTRA OPTIONAL,

 rsrq-ResultEUTRA-r16 RSRQ-RangeEUTRA-r16 OPTIONAL

 },

 ...

}

3> if available, set the *measResultNeighCells*, in order of decreasing ranking-criterion as used for cell re-selection, to include measurements of neighbouring cell that became available during the last logging interval and according to the following:

4> include measurement results for at most 6 neighbouring cells on the NR serving frequency and for at most 3 cells per NR neighbouring frequency and for the NR neighbouring frequencies in accordance with the following:

5> if *interFreqTargetInfo* is included in *VarLogMeasConfig*:

If early indication-r17:

 6> include measurement results for NR neighbouring frequencies that are included in both *interFreqTargetInfo* and *SIB4*; and for NR fequenceis that are included in both *interFreqTargetInfo* and measIdleCarrierListNR in the variable VarMeasIdleConfig

Else:

6> include measurement results for NR neighbouring frequencies that are included in both *interFreqTargetInfo* and *SIB4*;

5> else:

If early indication-r17:

6> include measurement results for NR neighbouring frequencies that are included in *SIB4,* and for NR fequenceis that are included in measIdleCarrierListNR in the variable VarMeasIdleConfig

Else:

6> include measurement results for NR neighbouring frequencies that are included in *SIB4*

If early indication-r17:

 4> include measurement results for at most 3 neighbours per inter-RAT frequency that is included in *SIB5*; and is included in measIdleCarrierListEUTRA in the variable VarMeasIdleConfig

Else:

4> include measurement results for at most 3 neighbours per inter-RAT frequency that is included in *SIB5*;

4> for each neighbour cell included, include the optional fields that are available;

VarMeasIdleConfig-r16 ::= SEQUENCE {

 measIdleCarrierListNR-r16 SEQUENCE (SIZE (1..maxFreqIdle-r16)) OF MeasIdleCarrierNR-r16 OPTIONAL,

 measIdleCarrierListEUTRA-r16 SEQUENCE (SIZE (1..maxFreqIdle-r16)) OF MeasIdleCarrierEUTRA-r16 OPTIONAL,

 measIdleDuration-r16 ENUMERATED {sec10, sec30, sec60, sec120, sec180, sec240, sec300, spare},

 validityAreaList-r16 ValidityAreaList-r16 OPTIONAL

}