3GPP TSG-RAN WG2 #117 R2-220xxxx

eMeeting, 21st February - 3rd March, 2022

Agenda Item: 8.13.4.1 Pre-discussions

Source: Huawei (email rapporteur)

**Title: Report of [Pre117-e][844][SONMDT] MDT related open issue list (Huawei)**

Document for: Discussion and decision

# 1 Introduction

This is report for pre-meeting discussion [Pre117-e][844][SONMDT] MDT related open issue list (Huawei). We will discuss open issue from R2-2201986.

 **[Pre117-e][844][SONMDT] MDT related open issue list (Huawei)**

Initial scope: Continue the discussion on the open issues for MDT listed in R2-2201986

Initial intended outcome: Summary of the offline discussion with e.g.:

* + - List of proposals for agreement (if any)
		- List of proposals that require online discussions
		- List of proposals that should not be pursued (if any)

Initial deadline (for companies' feedback): Feb 14

Initial deadline (for rapporteur's summary): Feb 17

# 2 Contact Points

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

|  |  |  |
| --- | --- | --- |
| Company | Name | Email Address |
| Qualcomm | Rajeev Kumar | rkum@qti.qualcomm.com |
| vivo | Kimba Dit Admou, Boubacar  | kimba@vivo.com |
| Ericsson | Ali Parichehreh | ali.parichehreh@ericsson.com |
| Nokia, Nokia Shanghai Bell | Malgorzata Tomala | malgorzata.tomala@nokia.com |
| Huawei, HiSilicon | Jun Chen | jun.chen@huawei.com |
| CATT | ShiJie | shijie@catt.cn |
| Apple | Sasha Sirotkin | ssirotkin@apple.com |
| CMCC | Xie Fang | xiefang@chinamobile.com |
| Sharp  | Chang Ningjuan | ningjuan.chang@cn.sharp-world.com |
| Samsung | Sangbum Kim | sb07.kim@samsung.com |

# 3 Discussion

## 3.1 Identified open issues that need company input into Pre117-e-offline

The following text is from [1], and this email discussion will focus on bullet 1 related open issues.

* **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.

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| --- | --- | --- |
| **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 |

## 3.2 CEF report enhancements

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| **Features** | **Topic** | **Open issues** | **Remark (from the report R2-2201986)** |
| CEF report enhancements | (1) Stored conditions | Figure out conditions of “consecutively” | This issue can be kept and relates to logging CEF reports consecutively, once the UE failure in the cell (A) is followed by a failure in another cell (B) and then followed by another failure in the previous cell (A) (but modified) |

For this open issue, it is the rapporteur’s understanding that the following two typical scenarios should be considered:

Scenario 1: Cell 1 (X CEFs) -> Cell 2 (Y CEFs) -> Cell 1 (Z CEFs)

Scenario 2: Cell 1 (X CEFs) -> Cell 2 (no CEFs) -> Cell 1 (Z CEFs)

*Note: X/Y/Z means the number of consecutive CEF, e.g. 1, 2, or other values.*

**At RAN2#116b-e meeting, it was agreed:**

**9 UE logs one CEF report entry in multiple CEF report list, for the failures happening consecutively in the same cell.**

For scenario 1, it is expected that the UE will store the multiple CEF reports as below:

* CEF report 1 (happened in Cell 1, numberOfConnFail=X)
* CEF report 2 (happened in Cell 2, numberOfConnFail=Y)
* CEF report 3 (happened in Cell 1, numberOfConnFail=Z)

For scenario 2, there may be two options for the UE logging of CEF reports:

Option 1: the UE only logs one CEF report (happened in Cell 1, numberOfConnFail=X+Z)

Option 2: the UE logs two CEF reports:

* CEF report 1 (happened in Cell 1, numberOfConnFail=X)
* CEF report 2 (happened in Cell 1, numberOfConnFail=Z)

It is noted that the above two scenarios are about mobility cases, and if the UE does not experience mobility procedures and there are consecutive CEF in one cell, it is expected that the previous agreed bullet 9 is applied.

**Question 1: For scenario 1, whether the above stored condition is acceptable?**

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

**Question 2: For scenario 2, which of options is preferred?**

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| **Company** | **Preferred option** | **Comments** |
| Qualcomm | Option 1 |  |
| vivo | Option 1 | No need for 2 CEF reports. |
| Ericsson  | Option 1 |  |
| Nokia | Option 1 | Its aligned with RAN2#116bis-e agreement to log one report for consecuitive failures in the same cell. But the number of connecton failures is increased |
| Huawei, HiSilicon | Option 1 | We think the UE should log the latest CEF report (following legacy CEF report handling). |
| CATT | Option 1 |  |
| Apple | Option 1 |  |
| CMCC | Option 1 |  |
| Sharp  | Option 1 | This may depend on how to define the “consecutive failures”. No strong opinion, and option 1 is more aligned with R16 CEF. |
| ZTE | Option 1 |  |
| Samsung | Option 1 |  |

**Question 3: Do companies have other comments? E.g. other scenarios, other stored conditions.**

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| **Company** | **Yes/No** | **Comments** |
| Ericsson |  | We propsoe the highlighted clause should be removed in the running CR, because even if the UE supports multiple CEF report, it should remove the content of the *VarConnEstFailReport* when a new failure occurs, because the content of the failure is already logged in the report list (i.e., *VarConnEstFailReportList*)2> if the UE does not support multiple CEF report:3> clear the content included in *VarConnEstFailReport* except for the *numberOfConnFail*, if any; |
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**Summary:**

For scenario 1, 11 companies are fine with the listed stored condition.

For scenario 2, 11 companies are fine with option 1.

**Agreeable proposal 1: When the UE occurs a new CEF, if the failed cell id of the CEF is the same as the failed cell id in the last entry in VarConnEstFailReportList, the UE replaces the last CEF report with the new CEF report and the numberOfConnFail is summed. Otherwise (two cell ids are different), the UE appends the new CEF into VarConnEstFailReportList.**

## 3.3 Excess packet delay for NR

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| **Features** | **Topic** | **Open issues** |
| 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 |

At the last RAN2 meeting, [2][3] provided some analysis and proposals. It is proposed to discuss them in order to solve the above open issues:

In [2], there are the following proposals:

**Proposal 1 New IE is introduced in 38.331 to enable the RAN node to configure the UE with excess delay measurement configuration.**

**Proposal 2 Given the time limitation, for definition of excess delay, its configuration and reporting for NR packets, RAN2 focuses on NR-DC scenarios.**

**Proposal 3 For excess delay configuration in NR-DC, RAN2 to discuss the Option 1 and Option 2 and decide on the most acceptable solution, possibly with the minimum standardization effort, given the time limits we have.**

**Option1: Node owning the RLC terminating point configures the UE**

**• For all MCG bearers (no matter MN or SN terminated), excess delay measurement configuration is sent from the MN CU-CP to the UE, and the UE reports the Excess delay measurement to the MN CU-CP.**

**• For all SCG bearers (no matter MN or SN terminated), excess delay measurement configuration is sent from the SN CU-CP to the UE, and the UE reports the Excess delay measurement to the SN CU-CP.**

**Option2: Node owning the PDCP terminating point configures the UE**

**• Similar to the solution for D1 configuration, for all the bearers, the CU-CP of the node owning the PDCP terminating point configures the UE with excess delay measurement configuration. To enable this solution either UE is allowed to be configured with multiple excess delay measurement per cell groups, or a coordination between MN and SN is needed in DC scenarios.**

**Question 4: Please companies provide your comments regarding the above proposals.**

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| **Company** | **Which of proposals are acceptable?** | **Comments** |
| Qualcomm | Option 2 |  |
| vivo | Option 2 |  |
| Ericsson | Option 2 |  |
| Nokia | Option 2 | This should be the same as D1 configuration.  |
| Huawei, HiSilicon | Option 2 | We understand that the RAN2 agreements on D1 configuration for NR-DC could be applied to excess delay measurements. |
| CATT | Option 2 |  |
| Apple | Option 2 |  |
| CMCC | Option 2 |  |
| Sharp | Option 2 |  |
| ZTE | Option 2 |  |
| Samsung | Option 2 |  |

**Summary:**

11 companies are fine with option 2.

**Agreeable proposal 2: For excess delay configuration in NR-DC, Node owning the PDCP terminating point configures the UE**

**• Similar to the solution for D1 configuration, for all the bearers, the CU-CP of the node owning the PDCP terminating point configures the UE with excess delay measurement configuration. To enable this solution either UE is allowed to be configured with multiple excess delay measurement per cell groups, or a coordination between MN and SN is needed in DC scenarios.**

In [3], there are the following proposals:

**Proposal 1: D1 delay ratio measurement results should include DRB id and excessDelay info, and they can be included in the IE *MeasResults*.**

**Proposal 2: D1 delay ratio measurement configuration should include DRB id and delay threshold, and they can be included in the IE *ReportConfigNR*.**

**Proposal 3: For D1 delay threshold values, the following values can be included:**

**250us, 0.5ms, 1ms, 2ms, 4ms, 10ms, 20ms, 50ms, 100ms, 500ms (10 values)**

**Question 5: Please companies provide your comments regarding the above proposals.**

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| **Company** | **Which of proposals are acceptable?** | **Comments** |
| Qualcomm  | Proposal 1 and proposal 3 | Similar solution method as D1 average delay measurement.  |
| vivo | P2 |  |
| Ericsson | P1, P3 | Regading P2, we think network should be able to configure different delay threshold for different DRBs, because:* Different DRBs are used for different slices, and different slices have different delay requirements (URLLC and eMBB)
* 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 widely different. E.g., the RTT for a DRB scheduled over 15KHz SCS would be potentially 8 times larger than the RTT for a DRB scheduled over 120KHz SCS.

Hence having a single delayThreshold for all these variant of the DRBs scheduled on different SCSs is not a useful configuration. Here is an example ASN.1:UL-ExcessDelayValueConfig-rxy ::= SEQUENCE (SIZE(1..maxDRB)) OF DRB-IdentityInfoDRB-IdentityInfo ::= SEQUENCE { drb-IdentityList SEQUENCE (SIZE (1..maxDRB)) OF DRB-Identity, delayThreshold ENUMERATED { ms025,ms05,ms1,ms\_xx,ms\_yy,spare4,spare3, spare2, spare1}} |
| Nokia | Proposal 1 | We should agree where the configuration and report results are passed (e.g. ReportCOnfig and MeasResults) and what it the content of the configuration as well as corresponding report.In LTE we had two kinds of measurement results:(like D1):UL-PDCP-DelayValueResult-r16 ::= SEQUENCE { drb-Id-r16 DRB-Identity, averageDelay-r16 INTEGER (0..10000), ...}UL-PDCP-DelayResult-r13 ::= SEQUENCE { qci-Id-r13 ENUMERATED {qci1, qci2, qci3, qci4, spare4, spare3, spare2, spare1}, excessDelay-r13 INTEGER (0..31), ...}None of these measurements were configured explicitly per DRB or QCI, while te measurements were provided with required granularity:2> if the *ul-DelayConfig* is configured for the associated *reportConfig*:3> ignore the *measObject*;3> configure the PDCP layer to perform UL PDCP Packet Delay per QCI measurement;2> if the *ul-DelayValueConfig* is configured for the associated *reportConfig*:3> ignore the *measObject*;3> configure the PDCP layer to perform UL PDCP Packet Delay value per DRB measurement;Thus, we believe the same approach can be followed: no need to provide DRB or QCI Ids in the config, but the UE would provide per any (available). |
| Huawei, HiSilicon | P1, P2, P3 | For P2, we agree with Ericsson that network should be able to configure different delay threshold for different DRBs. |
| CATT | P1 and P3 | For P2, we share the similar view with Ericsson. |
| Apple | P1, P3 |  |
| CMCC | P1 and P3 | For P2, we share the similar view with Ericsson. |
| Sharp  | P1, P3 |  |
| ZTE | P1/2/3 | We think P2 reflects what has been proposed by Ericsson, i.e., to have delay threshold configured per DRB. But how to capture it in ASN.1 could be further discussed. |
| Samsung | P1, P3 |  |

**Summary:**

P1: 10 companies support

P2: 3 companies support. Ericsson proposed that network should be able to configure different delay threshold for different DRBs, and 3 companies support. So it is proposed to discuss it

P3: 9 companies support

**Agreeable proposal 3: D1 delay ratio measurement results should include DRB id and excessDelay info, and they can be included in the IE *MeasResults*.**

**Agreeable proposal 4: For D1 delay threshold values, the following values can be included:**

**250us, 0.5ms, 1ms, 2ms, 4ms, 10ms, 20ms, 50ms, 100ms, 500ms (10 values)**

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

**Question 6: Do companies have other comments?**

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| **Company** | **Comments** |
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## 3.4 AreaConfiguration aspects

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| **Features** | **Topic** | **Open issues** | **Remark (from the report R2-2201986)** |
| AreaConfiguration aspects | (1) AreaConfiguration issue | The RAN2 LS R2-2111288 mentions some RAN2 work for Rel-17 | At RAN2#116--e meeting, RAN2 discussed and agreed on the following Lsout.R2-2109334 LS on Area scope configuration and Frequency band info in MDT configuration (R3-212824; contact: Huawei) RAN3 LS in Rel-17 NR\_ENDC\_SON\_MDT\_enh-Core To:RAN2* **[AT116e][830][SON/MDT] Reply LS on Area scope configuration and Frequency band info in MDT configuration (Huawei)**

 Based on R2-2109334 to figure out the acceptable version on Reply LS Intended outcome: Approved LS Deadline: 05:00 UTC, Friday November 5thR2-2111288 Reply LS on Area scope configuration and Frequency band info in MDT configuration=> LS is approved.In the LS, RAN2 mentions that some work may be needed for AreaConfiguration. From Rapporteur’s point of view, the solution is straightforward but it needs more RAN2 discussions. In addition, companies can also check RAN3 progress in order to synchronize both WGs on the topic.RAN2 works on the introduction of AreaConfiguration-r17 (including areaConfig-r16 and interFreqTargetList-r16 inside it with both fields being optional) in Rel-17 |

The remark is clear about the motivation and the solution direction. For the introduction of AreaConfiguration-r17, the draft ASN.1 changes are showed as below (based on the email rapporteur’s understanding). In addition, it is expected that the network will not send both area configuration fields to the UE, i.e. when then network sends logged MDT measurements to the UE, it can include either of two fields or no area configuration.

LoggedMeasurementConfiguration-r16-IEs ::= SEQUENCE {

 traceReference-r16 TraceReference-r16,

 traceRecordingSessionRef-r16 OCTET STRING (SIZE (2)),

 tce-Id-r16 OCTET STRING (SIZE (1)),

 absoluteTimeInfo-r16 AbsoluteTimeInfo-r16,

 areaConfiguration-r16 AreaConfiguration-r16 OPTIONAL, --Need R

 plmn-IdentityList-r16 PLMN-IdentityList2-r16 OPTIONAL, --Need R

 bt-NameList-r16 SetupRelease {BT-NameList-r16} OPTIONAL, --Need M

 wlan-NameList-r16 SetupRelease {WLAN-NameList-r16} OPTIONAL, --Need M

 sensor-NameList-r16 SetupRelease {Sensor-NameList-r16} OPTIONAL, --Need M

 loggingDuration-r16 LoggingDuration-r16,

 reportType CHOICE {

 periodical LoggedPeriodicalReportConfig-r16,

 eventTriggered LoggedEventTriggerConfig-r16,

 ...

 },

 lateNonCriticalExtension OCTET STRING OPTIONAL,

 nonCriticalExtension LoggedMeasurementConfiguration-v17xy-IEs~~SEQUENCE {}~~ OPTIONAL

}

LoggedMeasurementConfiguration-v17xy-IEs ::= SEQUENCE {

 areaConfiguration-v17xy AreaConfiguration-v17xy OPTIONAL, --Need R

nonCriticalExtension SEQUENCE {} OPTIONAL

}

– *AreaConfiguration*

The *AreaConfiguration* indicates area for which UE is requested to perform measurement logging. If not configured, measurement logging is not restricted to specific cells or tracking areas but applies as long as the RPLMN is contained in *plmn-IdentityList* stored in *VarLogMeasReport*.

***AreaConfiguration* information element**

-- ASN1START

-- TAG-AREACONFIGURATION-START

AreaConfiguration-r16 ::= SEQUENCE {

 areaConfig-r16 AreaConfig-r16,

 interFreqTargetList-r16 SEQUENCE(SIZE (1..maxFreq)) OF InterFreqTargetInfo-r16 OPTIONAL -- Need R

}

AreaConfiguration-v17xy ::= SEQUENCE {

 areaConfig-r16 AreaConfig-r16 OPTIONAL -- Need R,

 interFreqTargetList-r16 SEQUENCE(SIZE (1..maxFreq)) OF InterFreqTargetInfo-r16 OPTIONAL -- Need R

}

AreaConfig-r16 ::= CHOICE {

 cellGlobalIdList-r16 CellGlobalIdList-r16,

 trackingAreaCodeList-r16 TrackingAreaCodeList-r16,

 trackingAreaIdentityList-r16 TrackingAreaIdentityList-r16

}

InterFreqTargetInfo-r16 ::= SEQUENCE {

 dl-CarrierFreq ARFCN-ValueNR,

 cellList SEQUENCE (SIZE (1..32)) OF PhysCellId OPTIONAL

}

CellGlobalIdList-r16 ::= SEQUENCE (SIZE (1..32)) OF CGI-Info-Logging-r16

TrackingAreaCodeList-r16 ::= SEQUENCE (SIZE (1..8)) OF TrackingAreaCode

TrackingAreaIdentityList-r16 ::= SEQUENCE (SIZE (1..8)) OF TrackingAreaIdentity-r16

TrackingAreaIdentity-r16 ::= SEQUENCE {

 plmn-Identity-r16 PLMN-Identity,

 trackingAreaCode-r16 TrackingAreaCode

}

-- TAG-AREACONFIGURATION-STOP

-- ASN1STOP

| ***AreaConfiguration* field descriptions** |
| --- |
| ***InterFreqTargetInfo***If configured, it indicates the neighbouring frequency and cells for which UE is requested to perform measurement logging. |

**Question 7: Do companies agree with this proposal: introduce AreaConfiguration-r17 (including areaConfig-r16 and interFreqTargetList-r16 inside it with both fields being optional) in Rel-17.**

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

**Summary:**

11 companies say Yes to Q7.

**Agreeable proposal 5: Introduce AreaConfiguration-r17 (including areaConfig-r16 and interFreqTargetList-r16 inside it with both fields being optional) in Rel-17.**

# 4 Conclusions

Based on section 3 Discussion, the following proposals are made:

Agreeable proposals:

**Agreeable proposal 1: When the UE occurs a new CEF, if the failed cell id of the CEF is the same as the failed cell id in the last entry in VarConnEstFailReportList, the UE replaces the last CEF report with the new CEF report and the numberOfConnFail is summed. Otherwise (two cell ids are different), the UE appends the new CEF into VarConnEstFailReportList.**

**Agreeable proposal 2: For excess delay configuration in NR-DC, Node owning the PDCP terminating point configures the UE**

**• Similar to the solution for D1 configuration, for all the bearers, the CU-CP of the node owning the PDCP terminating point configures the UE with excess delay measurement configuration. To enable this solution either UE is allowed to be configured with multiple excess delay measurement per cell groups, or a coordination between MN and SN is needed in DC scenarios.**

**Agreeable proposal 3: D1 delay ratio measurement results should include DRB id and excessDelay info, and they can be included in the IE *MeasResults*.**

**Agreeable proposal 4: For D1 delay threshold values, the following values can be included:**

**250us, 0.5ms, 1ms, 2ms, 4ms, 10ms, 20ms, 50ms, 100ms, 500ms (10 values)**

**Agreeable proposal 5: Introduce AreaConfiguration-r17 (including areaConfig-r16 and interFreqTargetList-r16 inside it with both fields being optional) in Rel-17.**

To-be-decided proposals:

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

# 5 References

[1] R2-2201986, MDT related open issue list (Huawei), RAN2#116b-e

[2] R2-2200888, On layer-2 measurements Ericsson

[3] R2-2200971, Discussion on L2M Huawei, HiSilicon