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.

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| --- | --- | --- |
| Company | Name | Email Address |
| Ericsson | Ali Parichehreh | ali.parichehreh@ericsson.com |
| Qualcomm | Rajeev Kumar | rkum@qti.qualcomm.com |
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| Apple | Sasha Sirotkin | ssirotkin@apple.com |
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# 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.

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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 |

## 3.1 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 |  |
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## 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)**

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| **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 |  |
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**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?**

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| **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 |  |
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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?**

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| **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 |  |
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**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.**

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| **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](#_Toc95723858) *[delayThreshold](#_Toc95723858)* [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?**

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

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| **Company** | **Yes/No** | **Comments** |
| Ericsson | Yes |  |
| Qualcomm | Yes |  |
| Samsung | Yes |  |
| Huawei, HiSilicon | Yes |  |
| Apple | Yes |  |
| vivo | Yes |  |
| CATT | Yes |  |
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**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)?**

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| **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...* |
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# 4 Conclusions

[To be added]

# 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