**3GPP TSG RAN2 #114-e R2-21xxxxx**

**Electronic Meeting, 19th – 27th May 2021**

**Agenda Item:**  **8.13.3.2 Logged MDT enhancements**

**Source: Huawei, HiSilicon**

**Title:** **Summary on agenda item 8.13.3.2 Logged MDT enhancements**

**Document for: Discussion and Decision**

### 1 Introduction

This contribution is to summarize proposals from RAN2 contributions under AI 8.13.3.2, and the email title is as below (allocated by the session chair):

*[Pre114-e][803][SON/MDT] Summary on agenda item 8.13.3.2 Logged MDT enhancements(Huawei)*

### 2 Discussion

All the proposals are grouped in section 2.X, and previous RAN2 agreements and FFSes are also listed in section 5. Generally, proposals related to FFSes from the last RAN2 meeting are suggested for discussions (mainly about section 2.1, 2.2 and 2.3), while others may be discussed or just postponed.

#### 2.1 The content and scenarios for on demand SI

[1], CATT:

**Proposal 1: The following contents are suggested to record and report for on-demand SI:**

* **SIB(s) that UE intends to request;**
* **The times each SIB UE intends to request;**
* **Failed or successful on-demand SI indicator;**
* **Msg1-based or Msg3-based on-demand SI request;**

[5], OPPO:

**Proposal 2: Both the following two information is important for the network to optimize the SI configuration:**

* **Whether there is a specific SI in great need but not broadcast periodically.**
* **Whether there is a specific SI is not needed by most of UEs but it is in the periodical broadcast list.**

**Proposal 3: SI related information is recorded in the following scenario:**

* **When the maximum attempts of RACH for SI request are reached.**
* **When cell reselection occurs during the RACH for SI request.**
* **When the not-required/required SI is broadcast periodically by network**.

[6], ZTE:

**Proposal 1: Logging of connected SI request information can be postpone to next release.**

**Proposal 2: UE report to NW the SIBs that UE actually intends to request in Msg1/Msg3 on-demand SI regardless the on-demand SI procedure is successful or failed.**

[8], Ericsson:

Proposal 3: UE records intended SIBs for both successful and failed on-Demand SI request.

[11], Huawei, HiSilicon:

**Proposal 3: Agree on the following information in the new report:**

* **measResultFailedCell, locationInfo, measResultNeighCells, perRAInfoList**
* **an indicator to differentiate between Msg1 and Msg3**

**Proposal 5: In addition to the reported SIBs (which UE actually intendeds to request), the UE also indicates whether it is area specific.**

**Summary:**

From summary rapporteur’s point of view, the following proposals seem agreeable:

**Proposal 1: For the content for on demand SI:**

* **Introduce an indicator to differentiate between Msg1-based or Msg3-based on-demand SI request ([1], CATT; [11], Huawei, HiSilicon)**
* **UE records intended SIBs for both successful and failed on-Demand SI request. ([6], ZTE; [8], Ericsson)**

For connected SI request, as mentioned in [6], ZTE, it is unlink RACH based on demand SI and it may lead to extra work load, so it should be postponed. From summary rapporteur’s point of view, the following proposal can be discussed if time allows:

**Proposal 2: For the scenario for on demand SI:**

**Logging of connected SI request information can be postponed to next release. ([6], ZTE)**

#### 2.2 Signalling design for on demand SI

[1], CATT:

**Proposal 2: Logged MDT mechanism can be used for reporting on-demand SI request information.**

**Proposal 3: The following parameters can be included in on-demand SI request statistics configuration:**

* **The maximum number of SIB that can be recorded and reported;**
* **Statistics duration;**
* **Statistical trigger conditions;**
* **SIBs requiring statistics;**

[6], ZTE:

**Proposal 3: It is preferred to use logged MDT to log and report the Msg1/Msg3 on-demand SI request information.**

**Proposal 4: RA-InformationCommon shall also be included in logged MDT when on-demand SI information is included.**

[7], LG Electronics UK:

**Proposal 1. The current RA-report is extended to include on-demand SI related information.**

[8], Ericsson:

Proposal 4: RA report is extended to include on-demand SI related information.

Proposal 5: CEF report is used to log information regarding failed on-demand SI related information.

[10], Samsung:

**Proposal E.1 RA report is extended to consider even failure of RA initiated due to on-demand SI request only.**

**Proposal E.2 RAN2 clarifies whether to also consider Positioning SI/SIB in SI request optimization.**

**Proposal E.3 For on-demand SI optimization, an indicator is introduced to indicate if SI request was performed over either NUL or SUL.**

[11], Huawei, HiSilicon:

**Proposal 1: Extend the current RA report to include Msg1 and Msg3 success related information.**

**Proposal 2: Introduce on demand SI failure report to include Msg1/Msg3 SI failure related information, and the framework of CEF report can be considered.**

**Summary:**

From companies’ contributions, some options on the signalling aspect are provided, so it is proposed to agree on them as candidate options, and then decision can be made in this meeting or later.

**Proposal 3: There are the following options for reporting on demand SI related information:**

* **Option 1: Extend Logged MDT ([1], CATT; [6], ZTE)**
* **Option 2: Extend RA report ([7], LG Electronics UK; [10], Samsung)**
* **Option 3: ([8], Ericsson)**
  + **Extend RA report to include successful on-demand SI related information**
  + **Extend CEF report to include failed on-demand SI related information**
* **Option 4: ([11], Huawei, HiSilicon)**
  + **Extend RA report to include successful on-demand SI related information**
  + **Introduce a new report to include failed on-demand SI related information**

#### 2.3 Signalling-based logged MDT prioritization

[2], vivo:

Proposal 1 Upon reception of the assistance information (indicating the logged MDT type), NW shall be able to avoid the logged MDT being overwritten in the following scenario: the previously configured logged MDT is signalling-based, while the latest logged MDT configuration is management-based.

[3], Nokia:

**Proposal 1: The UE provides assistance information to the network on involvement in Signaling based MDT. The UE assistance information on involvement in Management based MDT is FFS.**

[7], LG Electronics UK:

**Proposal 2. If MDT configuration is released and the UE has un-retrieved logging information, the UE sends *UEAssistanceInformation* to inform the type of logging information (i.e. management-based, signaling-based) to the network.**

[8], Ericsson:

Proposal 6: UE needs to store the flag information until logged MDT report are collected by the network or till 48 hours after T330 expiry.

Proposal 7: A UE configured with signalling-based MDT sends an explicit reject message to RAN if it receives a management-based MDT configuration.

Proposal 8: Status of T330 timer can be included in the loggedMDTReject message to assist the network in avoiding overwriting.

[10], Samsung:

**Proposal A.1 Avoid discarding of sig-LogMDT results not yet retrieved by network (e.g. if UE following T330 expiry, did not connect to the RAT that configured sig-LogMDT)**

**Proposal A.2 To support UE assistance introduce a flag (single bit) that UE sets if it has pending LogMDT i.e. configuration is ongoing or logging results are available**

* + **Limited to sig-LogMDT and intra-PLMN cases**
  + **No distinction whether pending sig-LogMDT concerns current or another RAT (i.e. also used upon return from idle, possibly involving IRAT reselection**

**Proposal A.3 UE sets the logMDT pending flag in the following cases:**

* + **Upon transition to connected: I.e. same cases as for reporting availability of logMDT i.e. in setupComp, resumeComp, reconfigComp (includes HO to NR), reestablishComp. By extension of IE UE-MeasurementsAvailable (NR case)**
  + **(UE does not provide updated assistance e.g. upon T330 expiry or retrieval)**

**Proposal A.4 Transfer UE assistance between network nodes (change of MN, including IRAT mobility)**

**Proposal A.5 Consider making the feature conditionally mandatory (i.e. for R17 UE supporting logMDT)**

1. If agreed, introduce a field in SI/ broadcast indicating network support of the feature
2. Otherwise, introduce a field in OtherConfig by which network configures whether UE shall provide the assistance and a corresponding UE capability

[11], Huawei, HiSilicon:

**Proposal 4: Overwriting of signalling based MDT shall be avoided when:**

**1) Signalling based Logged MDT is configured, but no results are available e.g. so far nothing stored, or all previously stored results retrieved**

**2) Signalling based Logged MDT configuration is stopped (i.e. the expiry of T330), but UE still has un-retrieved results that would be discarded upon accepting a new configuration**

Summary:

From companies’ contributions, some options on the signalling aspect are provided, so it is proposed to agree on them as candidate options, and then decision can be made in this meeting or later.

**Proposal 4: In order to avoid overwriting of signalling-based logged MDT, there are the following options:**

|  |  |  |
| --- | --- | --- |
| **Options** | **Source** | **Detailed proposals** |
| 1 | [2], vivo | Proposal 1: Upon reception of the assistance information (indicating the logged MDT type), NW shall be able to avoid the logged MDT being overwritten in the following scenario: the previously configured logged MDT is signalling-based, while the latest logged MDT configuration is management-based. |
| 2 | [7], LG Electronics UK | Proposal 2. If MDT configuration is released and the UE has un-retrieved logging information, the UE sends *UEAssistanceInformation* to inform the type of logging information (i.e. management-based, signaling-based) to the network. |
| 3 | [8], Ericsson | Proposal 6: UE needs to store the flag information until logged MDT report are collected by the network or till 48 hours after T330 expiry.  Proposal 7: A UE configured with signalling-based MDT sends an explicit reject message to RAN if it receives a management-based MDT configuration.  Proposal 8: Status of T330 timer can be included in the loggedMDTReject message to assist the network in avoiding overwriting. |
| 4 | [10], Samsung | Proposal A.1, A.2, A.3 |
| 5 | [11], Huawei, HiSilicon | The UE reports the logged MDT type to the network only when:   Signalling based Logged MDT is configured, but no results are available e.g. so far nothing stored, or all previously stored results retrieved   Signalling based Logged MDT configuration is stopped (i.e. the expiry of T330), but UE still has un-retrieved results that would be discarded upon accepting a new configuration |

From summary rapporteur’s point of view, option 1/2/4/5 are to reply on network to solve the issue (e.g. by network implementation), and option 3 suggests that UE rejects network configuration. Among all proposals, how the UE should set the assistance information is also heavily discussed.

#### 2.4 MDT in NR-U

[3], Nokia:

**Proposal 2: RAN2 should consider expanding MDT framework to provide logging solution for Unlicensed access.**

**Proposal 3:** **RAN2 should consider expanding MDT reports to provide a solution for recording of a cancellation of an LBT failure.**

#### 2.5 Logging information for UL/DL coverage unbalanced

[3], Nokia:

**Proposal 4: RLF report is extended with “DL quality” information for better characterization of the DL signal during an UL outage**.

#### 2.6 SNPN related discussions

[3], Nokia:

**Proposal 5:** Rel-17 Logged MDT and RLF report supports SNPN check.

**Proposal 6:** The cell identification in MDT and SON messages should allow the use of SNPN.

#### 2.7 logged MDT regarding RAT-specific coverage hole

[5], OPPO:

**Proposal 1: RAN2 to agree to start the specification work for logging RAT-specific coverage hole in the logged measurement report in R17.**

#### 2.8 Early measurements’ logging in logged MDT report

[8], Ericsson:

Proposal 1 The neighbor cell measurements in the logged MDT includes information indicating whether the measurements are associated to overlapping carriers (carriers included in early measurement configuration) or non-overlapping carriers (carriers included only in reselection SIBs).

Proposal 2 Measurement values related to Early measurement carriers are incorporated into logged MDT report irrespective of the qualityThreshold criterion configured in the early measurement configuration.

#### 2.9 Logged measurement continuity

[9], Qualcomm:

**Proposal 1: UE can be configured with two logged measurement configurations, one over LTE and another over NR, without SN configuration. LTE and NR logged MDT configurations are independent, and UE performs logging based on the logged MDT configuration of the same RAT its camps.**

**Proposal 2: To support the UE configurability with up to two different logged measurement configurations without SN configuration, “the old loggedMeasurementConfiguration is not released if the new loggedMeasurementConfiguration is received from another RAT.”**

**Proposal 3: Introduce a UE capability to indicate that UE can be configured with two logged measurement configurations, one over LTE and another over NR in the MR-DC capability container.**

[10], Samsung:

**Proposal B.1 No R17 are needed to capture agreement that SN configuration is not supported for logged MDT**

#### 2.10 Enhancements on event triggered MDT

[9], Qualcomm:

**Proposal 4: Introduce mechanisms to detect the RAT-specific and frequency-specific coverage hole.**

**Proposal 5: Introduce *eventTriggered* measurements to detect RAT-specific coverage holes when UE cannot find a suitable cell to camp on a given RAT.**

**Proposal 6: Introduce *eventTriggered* measurements to detect frequency-specific coverage holes when UE cannot find a suitable cell operating on a given frequency or a list of frequencies.**

#### 2.11 Further details logging for NR SCG frequencies not used for camping (EMR)

[10], Samsung:

**Proposal C.1 Introduce a flag in SI/ broadcast indicating network support for nonSIB frequencies**

* + 1. One flag, common for interFreq (nonSIB4) and interRAT (nonSIB5), as extension of SIB1
    2. Only if flag is set, UE reports results of nonSIB frequencies
    3. Only if flag is set, UE will consider nonSIB frequencies for setting availability

**Proposal C.2 Do not introduce further signaling changes, meaning that:**

1. No separate flag in logMDT config indicating whether UE shall log available results for nonSIB frequencies
2. No separate field to indicate availability of results for non-SIB frequencies (but setting of existing availability indication is affected by field specifying target frequencies or flag)
3. No separate field by which network requests results for non-SIB frequencies (but provides results of non-SIB frequencies based on field specifying target frequencies or flag)
4. No separate field for results for non-SIB frequencies i.e. results are provided in separate entry of per frequency list of neighbouring results (according to current ASN.1)

**Proposal C.3 Consider introducing a field indicating target IRAT frequencies**

**Proposal C.4 Consider making the feature conditionally mandatory in R17 (mandatory for an R17 UE supporting logMD and EMR)**

#### 2.12 IDC and logged MDT

[10], Samsung:

**Proposal D.1 Upon detecting IDC, the UE continues event based measurement logging. When adding an entry in VarLogMeasReport due to triggering an event, the UE includes a field indicating the UE experiended IDC, if applicable**

**Proposal D.2 Upon detecting IDC, the UE suspends periodic measurement logging and if VarLogMeasReport has entries it adds an entry only comprising a field indicating that IDC was detected. When IDC problems are resolved, the UE resumes periodic measurement logging. I.e. do same as in LTE**

### 3 Conclusion

Section 2.1, 2.2 and 2.3 are mainly about the FFSes from RAN2#113b-e meeting, and the agreeable proposals are:

**Proposal 1: For the content for on demand SI:**

* **Introduce an indicator to differentiate between Msg1-based or Msg3-based on-demand SI request ([1], CATT; [11], Huawei, HiSilicon)**
* **UE records intended SIBs for both successful and failed on-Demand SI request. ([6], ZTE; [8], Ericsson)**

**Proposal 3: There are the following options for reporting on demand SI related information:**

* **Option 1: Extend Logged MDT ([1], CATT; [6], ZTE)**
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* **Option 4: ([11], Huawei, HiSilicon)**
  + **Extend RA report to include successful on-demand SI related information**
  + **Introduce a new report to include failed on-demand SI related information**

**Proposal 4: In order to avoid overwriting of signalling-based logged MDT, there are the following options:**

|  |  |  |
| --- | --- | --- |
| **Options** | **Source** | **Detailed proposals** |
| 1 | [2], vivo | Proposal 1: Upon reception of the assistance information (indicating the logged MDT type), NW shall be able to avoid the logged MDT being overwritten in the following scenario: the previously configured logged MDT is signalling-based, while the latest logged MDT configuration is management-based. |
| 2 | [7], LG Electronics UK | Proposal 2. If MDT configuration is released and the UE has un-retrieved logging information, the UE sends *UEAssistanceInformation* to inform the type of logging information (i.e. management-based, signaling-based) to the network. |
| 3 | [8], Ericsson | Proposal 6: UE needs to store the flag information until logged MDT report are collected by the network or till 48 hours after T330 expiry.  Proposal 7: A UE configured with signalling-based MDT sends an explicit reject message to RAN if it receives a management-based MDT configuration.  Proposal 8: Status of T330 timer can be included in the loggedMDTReject message to assist the network in avoiding overwriting. |
| 4 | [10], Samsung | Proposal A.1, A.2, A.3 |
| 5 | [11], Huawei, HiSilicon | The UE reports the logged MDT type to the network only when:   Signalling based Logged MDT is configured, but no results are available e.g. so far nothing stored, or all previously stored results retrieved   Signalling based Logged MDT configuration is stopped (i.e. the expiry of T330), but UE still has un-retrieved results that would be discarded upon accepting a new configuration |

The following proposal can be discussed if time allows:

**Proposal 2: For the scenario for on demand SI:**

**Logging of connected SI request information can be postponed to next release. ([6], ZTE)**

### 4 Tdocs under 8.13.3.2 Logged MDT enhancements

[1] R2-2104932 Consideration on MDT Enhancements for On-demand SI CATT discussion

[2] R2-2105335 Discussion on Logged MDT configuration vivo discussion

[3] R2-2105478 Logged MDT and other enhancements Nokia, Nokia Shanghai Bell discussion

[4] R2-2105616 Consideration of enhancements for logged MDT OPPO discussion

[5] R2-2105625 Consideration of enhancements for logged MDT OPPO discussion

[6] R2-2105840 Remaining issues on logged MDT ZTE Corporation, Sanechips discussion

[7] R2-2105884 Discussion on FFS issues LG Electronics UK discussion

[8] R2-2106004 On logged MDT related enhancements Ericsson discussion

[9] R2-2106037 Logged measurement Enhancements QUALCOMM Incorporated discussion

[10] R2-2106057 R17 Logged MDT issues (on overwrite, IRAT/ MR-DC, logging non camping freqs, IDC and OSI) Samsung Telecommunications discussion

[11] R2-2106152 Discussion on logged MDT enhancements Huawei, HiSilicon discussion

### 5 Previous RAN2 agreements and FFSes on logged MDT enhancements

#### 5.1 RAN2#113b-e

[R2-2104434](http://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_113bis-e/Docs/R2-2104434.zip) Report of [AT113b-e][804][NR/R17 SON/MDT] Logged MDT (CMCC) CMCC

Agreements:

1 UE reports the SIBs that UE actually intends to request.

2 Both Msg1-based and Msg3-based SI request related information are supported.

3 Option 3 ([R2-2104434](http://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_113bis-e/Docs/R2-2104434.zip)) is used for logged MDT in EN-DC, i.e., do not introduce SN configuration for logged MDT (neither for camping nor for non-camping/ EMR specific frequencies).

4 UE provides assistance by which network can avoid overwriting of an MDT configuration.

5 Introduce the logged MDT type (i.e. the management based MDT or the signalling based MDT) in the logged MDT configuration.

Proposal 4: It is FFS whether to extend current RA-report to include the on demand SI related information.

Proposal 6: It is FFS whether there is a need to avoid logged MDT configuration in the following cases from network perspective:

1) Logged MDT is configured, but no results are available e.g. so far nothing stored, or all previously stored results retrieved

2) Logged MDT configuration is released, but UE still has un-retrieved results that would be discarded upon accepting a new configuration

#### 5.2 RAN2#113-e

[R2-2102143](http://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_113-e/Docs/R2-2102143.zip) Report of [AT113-e][844][NR/R17 SON/MDT]  Logged MDT part I Huawei

Agreement:

The network can use a flag in logged MDT configuration to indicate if an early measurement/idle mode configuration has relevance for logged measurement purposes. Upon such an indication, UE can log measurements on non-cellReselection (carrier frequencies not part of SIB4 or SIB5). AreaConfig and/or InterFreqTargetInfo can be used for filtering of SIB4 and non-SIB4 frequencies. Whether a flag is needed should be FFS.

[R2-2102142](http://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_113-e/Docs/R2-2102142.zip) Report of [AT113-e][845] [NR/R17 SON/MDT] Logged MDT part II (CMCC) CMCC

=> UE records the on demand SI related information for following scenarios:

1. Failed on-demand SI request

2. Successful on-demand SI request

Agreements:

1 One specific raPurpose is introduced for MSG3 based on demand SI request.

All the following proposals can be discussed through post meeting email discussion.

FFS: UE reports its requested notBroadcasting SI message. It is FFS to only report the SIBs UE actually intends to request.

Proposal 2: It is FFS to consider following scenarios:

3. Cell reselection occurs during the RACH for SI request.

4. The required SI is already broadcast periodically by network

5. Detecting geographic areas that are (unintentionally) covered by a non-desired SIA

6. Connected on-demand SI request cases

Proposal 4: It is FFS for UE to report Time elapsed since the SI request initiation or the UE modem realizes the need for on demand SI until the successful SI acquisition or the acquisition failure.

Proposal 6: It is FFS whether only Msg3-based SI request related information is reported.

Proposal 7: It is FFS whether to extend current RA-report to include the on demand SI information.

#### 5.3 RAN2#112-e

R2-2010897 Report of [AT112-e][804][NR/R17 SON/MDT] MDT enhancements (Huawei)

Agreements:

1 NR MDT support IDC mechanism, including:

- upon detection of IDC, the UE suppress logging and tag MDT report with InDeviceCoexDetected flag.

- UE resumes the measurement logging when the IDC problem is resolved

=> RAN2 to investigate logging early measurements.

=> RAN2 to investigate MDT and On-demand SI.

=> Other topics are still open to be pursued.

#### 5.4 RAN2#111-e (the 1st meeting for the WI)

[R2-2007771](http://www.3gpp.org/ftp/tsg_ran/wg2_rl2/tsgr2_111-e/Docs/R2-2007771.zip) Summary on 8.13.3 MDT Huawei, HiSilicon discussion Rel-17 NR\_ENDC\_SON\_MDT\_enh-Core Late

=> The coexistence issue between IDC and MDT feature is identified and the legacy mechanism defined in LTE spec is the baseline. FFS on potential enhancements.

=> Study the support of logged and Immediate MDT in MR-DC scenario. For M5/M6/M7, it is proposed to apply them for EN-DC/MR-DC cases with different bear types. FFS on details.