3GPP TSG-RAN WG2 Meeting #119bis Electronic draftR2-2210787

Online, 10 – 19 October 2022

**Agenda item: 8.13.3**

**Source: Nokia, Nokia Shanghai Bell**

**Title: Summary on 8.13.3 ‘MDT override’**

**WID/SID:** **NR\_ENDC\_SON\_MDT\_enh2-Core - Release 18**

**Document for: Discussion and Decision**

# 1 Introduction

This document is to summarize proposals submitted to RAN2#119bis-e on Rel-18 WI on SON/MDT enhancements, for the following WI objective:

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| - Support of signaling based logged MDT override protection to address the scenario where the signaling based **MDT is configured in E-UTRAN** when [RAN2, RAN3]:* UE reselects to NR while logged measurements are collected
* UE reselects to NR after logged measurements are collected and before uploading the logged MDT report.
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The document collects and summarizes the follow-up proposals made in the companies’ contributions in [1]-[8] and proposes to conclude the way forward with a set of agreeable Rel-18 enhancements.

# 2 Discussion

## 2.1 Scenarios in Rel-18

Scenarios to be addressed in Rel-18 were discussed in RAN2#119-e [9]. The baseline agreements made in RAN2#119-e confirmed the Rel-18 enhancements objective is to address the scenario where Logged MDT is configured in E-UTRA, and the UE reselects to NR cell. Even though, RAN2#119-e discussed potential extension of the scope, it wasn’t explicitly agreed that the reverse scenario is excluded.

Though, majority of the proposals focus on the agreed scenario, it can be noted from contribution in [1] and [3] that proposals made to RAN2#119bis-e intends to either confirm the reverse scenario is not included in Rel-18 scope, or contrary it is still potential area for further development. The following proposals are made in that regard:

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| CATT [1] | Proposal 1: Exclude the scenario i.e. the UE is configured with NR sig-based logged MDT measurement configuration/result reselects to E-UTRAN in R18 scope. |
| Huawei [3] | Proposal 3: **When reselects to E-UTRAN from NR, the UE informs the eNB** whether T330 is running and whether the UE locally still has logged measurements available for NR. |

As the foreseen scope would determine the specification impacts substantially, the rapporteur suggest to explicitly understand RAN2 position on the proposal:

**Proposal 1**: The scenario when the UE is configured with NR Signaling-based logged MDT measurement configuration and reselects to E-UTRAN is excluded in R18 scope.

## 2.2 Inter-RAT Signalling based MDT override protection

### 2.2.1 Logged MDT configuration

To fulfil the Rel-18 objective, the baseline agreements made in RAN2#119-e were the following:

Agreement:

1 RAN2 confirms the valid scenario for Rel-18 inter-RAT scenario for signalling based logged MDT override protection is set by the WID:

 a. **Logged MDT is configured in E-UTRAN**, the UE reselects to NR.

2 Rel-17 mechanism for signalling based logged MDT override protection in intra-NR scenario is the baseline for Rel-18 inter-RAT scenario.

Majority of the contributions to RAN2#119bis-e assumed that existing Rel-17 solution, that enables Logged MDT type configuration from the NW, and an assistance information in uplink messages from the UE consists of a baseline for the Rel-18 enhancements.

With that understanding the following proposals were made for the Logged MDT configuration to support Signalling based MDT protection in inter-RAT scenario:

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| Samsung [2] | Proposal 1: Extend **LTE LoggedMeasurementConfiguration** with Logged MDT type indication. |
| Huawei [3] | Proposal 1: **E-UTRAN eNB informs** the UE of the MDT type when configures the UE with signalling based logged MDT. |
| Xiaomi [4] | Proposal 1: RAN2 confirms to support the inter-RAT override protection for logged based MDT via the UE-assisted and network-based solution.Proposal 3: RAN2 considers to reuse the *sigLoggedMeasType* and the *sigLogMeasConfigAvailable* with the removal of the intra-NR restriction, to allow UE indicate the T330 timer status and report availability of E-UTRAN signaling based logged MDT to gNB.Proposal 4: No need for extra network indication for E-UTRAN signaling logged MDT configuration. |
| Ericsson [5] | [Proposal 1 Signalling based MDT configuration flag is provided to LTE UEs **as part of LTE** logged MDT configuration.](#_Toc115351145) |
| Nokia [6] | Proposal 1: **LTE** *LoggedMeasurementsConfiguration* is extended with “Logged MDT type” IE, which explicitly indicates involvement in Signaling based MDT. |

Besides [4], all the proposals hint that E-UTRAN needs to indicate to the UE the flag on Signalling based MDT configuration. While in [4], the proposal is to reuse *sigLoggedMeasType* by removal of the intra-NR restriction, TS38.331 isn’t RAT agnostic specification. Therefore, the following is proposed:

**Proposal 2:** E-UTRA logged MDT configuration is enhanced to include ‘Logged MDT type’ indication, to indicate the UE is configured with Signaling-based Logged MDT in E-UTRA.

**Proposal 3:** The UE stores the received ‘Logged MDT type’ indication (as an extension to the other legacy E-UTRA Logged MDT configuration parameters).

### 2.2.2 UE behaviour upon reselecting to an NR cell

To achieve the override protection for LTE Logged MDT configuration when UE moves to NR from LTE , all companies see the need to signal an indicator to the gNB:

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| CATT [1] | Proposal 2: RAN2 to discuss the following two options to address the inter-RAT scenario in R18 WID for signaling based logged MDT override protection.Option 1: **UE provides the available indicator to NR network** to avoid NR override configurationOption 2: UE provides the available indicator to NR network and NR network can request the E-UTRAN results which is not retrieved |
| Samsung [2] | Proposal 2: **UE informs gNB whether signaling based MDT is configured** when it is configured by E-UTRA.Proposal 3: R17 **NR signaling can be reused** by the UE to inform gNB whether signaling based MDT is configured even when it is configured by E-UTRA. |
| Huawei [3] | Proposal 2: For the indication to gNB due to E-UTRAN logged MDT, it is proposed RAN2 to discuss the following two options:Option 1: **re-use** the existing ***sigLogMeasConfigAvailable***Option 2: **introduce a new IE** *sigLogMeasConfigAvailableLTE* |
| Xiaomi [4] | Proposal 2: To support the inter-RAT override protection for logged based MDT, **UE can indicate** the following assistance information **to gNB**:* Whether the signaling based logged MDT is configured in the E-UTRAN
* T330 timer status for the E-UTRAN
* Report availability for the E-UTRAN

Proposal 3: RAN2 considers **to reuse** the *sigLoggedMeasType* and **the *sigLogMeasConfigAvailable*** with the removal of the intra-NR restriction, to allow UE indicate the T330 timer status and report availability of E-UTRAN signaling based logged MDT to gNB.Proposal 5: Include **an indicator to indicate gNB whether the signaling based logged MDT is configured** in E-UTRAN or not. |
| Ericsson [5] | [Proposal 2: In NR, **UE reports availability of signalling based logged MDT configuration** without checking the RAT information.](#_Toc115351146)[Proposal 3: **The indication in NR** to report availability of signalling based logged MDT **can be re-used** for LTE.](#_Toc115351147) |
| Nokia [6] | Proposal 3: FFS how the stored LTE parameter “Logged MDT type” in is used by the **UE to indicate the Signaling MDT configuration availability** upon connecting to an NR cell. |
| ZTE [7] | Proposal 4: **UE indicated in *RRCSetupComplete* message there is a available EUTRA signalling based** MDT configuration or EUTRA signalling based MDT results unfetched to NW when select from EUTRA to NR. ffs reusing existing bit (*sigLogMeasConfigAvailable*) or introducing new bit.  |
| Qualcomm [8] | Proposal 1: RAN2 is requested to down-select one option among option 1 and option 2 by analyzing the pro and cons. 1. Override protection by simultaneous LTE and NR configuration: A UE capable of storing LTE and NR logged MDT configurations and reports simultaneously can signal this capability. Nothing is required from the network.
2. Override protection by cross-RAT signaling, no cross-RAT reporting: A UE capable of reporting whether it is configured with signaling-based logged MDT in LTE or has unretrieved LTE logged MDT data, **sends the gNB an indication if UE is configured with signaling-based logged MDT** configuration or has unretrieved corresponding logged MDT data. The gNB does not configure UE with NR-logged MDT configuration upon such indication.
3. Override protection by cross-RAT reporting: A UE capable of cross-RAT reporting from LTE to NR sends an indication if UE is configured with signaling-based logged MDT configuration or has unretrieved corresponding logged MDT data. UE also sends cross-RAT logged MDT availability indication and logged MDT reporting. The gNB does not configure NR logged MDT until it extracts unretrieved logged MDT and until logged MDT configuration remains valid.
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It can be observed, the proposals assume that the UE will notify the gNB about a presence of the Signalling based Logged MDT configuration from E-UTRA. However, there are further different approaches undertaken for a detailed method. For instance, [2], [3], [4], [5], [7] assume the existing NR availability indicator can be reused. While, [3] and [7] propose defining a new bit.

The rapporteur notes that agreement on reusing of the NR baseline, leads to a straightforward extension that relevant NR uplink RRC Complete messages would need to pass the information on the UE involvement in Signalling based Logged MDT configuration from E-UTRA. While how to pass the information requires further studies. Thus, the suggested proposal on a converging direction is the following:

**Proposal 4:** In NR cell, the UE notifies the gNB about the Signaling-based Logged MDT from E-UTRA availability. FFS whether a new NR flag is introduced or the existing NR flag: *sigLogMeasConfigAvailable* is adopted.

### 2.2.3 Conditions for indicating the availability indicator

Following, the NR baseline, to send the availability indicator on involvement in Signalling based Logged MDT configuration, the UE differentiates the status of logging timer and availability of the MDT logs. This behaviour has been proposed to be adopted to the inter-RAT scenario as follows:

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| Huawei [3] | Proposal 3: When reselects to E-UTRAN from NR, the UE informs the eNB whether T330 is running and whether the UE locally still has logged measurements available for NR. |
| Xiaomi [4] | Proposal 2: To support the inter-RAT override protection for logged based MDT, UE can indicate the following assistance information to gNB:* Whether the signaling based logged MDT is configured in the E-UTRAN
* T330 timer status for the E-UTRAN
* Report availability for the E-UTRAN
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| Ericsson [5] | [Proposal 4 If the UE in NR network has LTE signalling based logged MDT report and T330 timer has expired, NR nodes can fetch the LTE logged MDT report.](#_Toc115351148) |
| Nokia [6] | Proposal 3: FFS how the stored LTE parameter “Logged MDT type” in is used by the UE to indicate the Signaling MDT configuration availability upon connecting to an NR cell. |
| ZTE [7] | Proposal 1: For UE configured with signalling logged MDT in EUTRA and reselects to NR, below two cases are considered for signalling MDT protection:* Case 1: Signalling based EUTRA logged MDT configuration is valid (T331 is running), and/or
* Case 2: Signalling based EUTRA logged MDT results is available and unfetched
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Therefore, RAN2 needs to discuss the meaning of the flag indicating the UE involvement in SIgnaling based Logged MDT session, and detailed conditions on its setting:

**Proposal 5**: RAN2 discuss whether the UE reported NR flag on Signaling based Logged MDT configuration presence needs to also reflect T331 status and/or E-UTRA logged MDT results availability.

### 2.2.4 E-UTRA Logged MDT results reporting in NR

The foreseen updates to the RRC signaling and procedures would require further measurements reporting. Two contributions [1], [5] explicitly propose the option to retrieve the E-UTRA Logged MDT results in NR, by the gNB, while [8] propose to avoid this step by simply not configuring the UE, upon the availability flag reception:

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| --- | --- |
| CATT [1] | Proposal 2: RAN2 to discuss the following two options to address the inter-RAT scenario in R18 WID for signaling based logged MDT override protection.Option 1: UE provides the available indicator to NR network to avoid NR override configurationOption 2: UE provides the available indicator to NR network and **NR network can request the E-UTRAN results** which is not retrieved |
| Ericsson [5] | [Proposal 4 If the UE in NR network has LTE signalling based logged MDT report and T330 timer has expired, **NR nodes can fetch the LTE logged MDT report.**](#_Toc115351148) |
| Qualcomm [8] | Proposal 1: RAN2 is requested to down-select one option among option 1 and option 2 by analyzing the pro and cons. 1. Override protection by simultaneous LTE and NR configuration: A UE capable of storing LTE and NR logged MDT configurations and reports simultaneously can signal this capability. **Nothing is required from the network**.
2. Override protection by cross-RAT signaling, no cross-RAT reporting: A UE capable of reporting whether it is configured with signaling-based logged MDT in LTE or has unretrieved LTE logged MDT data, sends the gNB an indication if UE is configured with signaling-based logged MDT configuration or has unretrieved corresponding logged MDT data. **The gNB does not configure UE with NR-logged MDT configuration upon such indication.**
3. Override protection by cross-RAT reporting: A UE capable of cross-RAT reporting from LTE to NR sends an indication if UE is configured with signaling-based logged MDT configuration or has unretrieved corresponding logged MDT data. UE also sends cross-RAT logged MDT availability indication and logged MDT reporting. The gNB does not configure NR logged MDT until it extracts unretrieved logged MDT and until logged MDT configuration remains valid.
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It is noted that targeting reuse of the Rel-17 principles for inter-RAT scenario remains ambiguous on that aspect. The framework could reuse the UE NR indications and let NW to handle the RAT-specific configurations without the need to retrieve the reports, while still serving the purpose to avoid the potential overriding. For that reason, it is proposed:

**Proposal 6**: RAN2 discuss whether the UE needs to report E-UTRA Logged MDT results in NR.

### 2.2.5 Signalling based logged MDT configuration priority

There is one more detailed aspect brought up in [3] and [7] for handling the Signalling based logged MDT configuration in Rel-18, which considers the enhancements on prioritising the configurations in inter-RAT scenario:

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| Huawei [3] | Proposal 4: RAN2 to consider priority levels for inter-system MDT override protection. |
| ZTE [7] | Proposal 3: RAN2 further discuss whether priority handling for signalling logged MDT configuration between different RAT types is needed or not. |

Generally, it can be noted that the UE assistance to indicate it has received Signalling based Logged MDT configuration in E-UTRAN, can already serve the purpose to prioritize Signalling based MDT configuration over Management based MDT configuration. Therefore, the rapporteur considers the above proposals address more detailed aspects for handling the inter-RAT scenario in Rel-18, which depends on the initial conclusions on the configuration and reports availability handling (addressed in section 2.2), hence the proposal is to discuss the proposals once the framework becomes more mature. postpone the proposals until the solution direction is concluded.

**Proposal 7**: RAN2 discussion on priority handling for Signalling based Logged MDT in inter-RAT scenario is postponed.

## 2.3 Other Rel-18 enhancements

### 2.3.1 L2 measurements

In RAN2#119-, in the scope of Rel-17 discussions, the following was noted[9]:

3 Total RAN delay calculation formula for split DRB is to be discussed in Rel-18, for the following scenario:

 PDCP duplication was enabled per packet basis i.e., some packets transmitted with duplication and some packets without dupplication in a delay measurement period.

=> RAN2 discuss whether to specify the total RAN delay formula in TS 38.314 or liaise SA5 to consider the formulas in their specification.

Following the conclusion, the following proposal is made in [5]:

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| Ericsson [5] | [Proposal 5 RAN2 implement the formula for total RAN delay calculation based on the provided TP and send an LS to SA5 to take the formula into account.](#_Toc115351149) |

Considering limited input on the subject, it is proposed to confirm:

**Proposal 8**: RAN2 to discuss whether Rel-18 WI objectives should be extended to consider new L2 measurement for total RAN delay calculation.

# 3 Conclusion

This document has made the following proposals:

**Proposal 1**: The scenario when the UE is configured with NR sig-based logged MDT measurement configuration and reselects to E-UTRAN is excluded in R18 scope.

**Proposal 2:** E-UTRA logged MDT configuration is enhanced to include ‘Logged MDT type’ indication, to indicate the UE is configured with Signaling-based Logged MDT in E-UTRA.

**Proposal 3:** The UE stores the received ‘Logged MDT type’ indication (as an extension to the other legacy E-UTRA Logged MDT configuration parameters).

**Proposal 4:** In NR cell, the UE notifies the gNB about the Signaling-based Logged MDT from E-UTRA availability. FFS whether a new NR flag is introduced or the existing NR flag: *sigLogMeasConfigAvailable* is adopted.

**Proposal 5**: RAN2 discuss whether the UE reported NR flag on Signaling based Logged MDT configuration presence needs to also reflect T331 status and/or E-UTRA logged MDT results availability.

**Proposal 6**: RAN2 discuss whether the UE needs to report E-UTRA Logged MDT results in NR.

**Proposal 7**: RAN2 discussion on priority handling for Signalling based Logged MDT in inter-RAT scenario is postponed.

**Proposal 8**: RAN2 to discuss whether Rel-18 WI objectives on SON/MDT enhancements, should be extended to consider new L2 measurement for total RAN delay calculation.

# References

1. R2-2209570, Discussion on Inter-RAT Signaling Based Logged MDT Override Protection; CATT
2. R2-2209808, Inter-RAT signalling based logged MDT override protection, Samsung R&D Institute India
3. R2-2209896, Discussion on the inter-system signalling based MDT override protection; Huawei, HiSilicon
4. R2-2210028, Considerations on the signaling based logged MDT override protection for E-UTRAN; Beijing Xiaomi Software Tech
5. R2-2210182, MDT enhancements; Ericsson
6. R2-2210267, Signalling based Logged MDT override protection; Nokia, Nokia Shanghai Bell
7. R2-2210288, Consideration on MDT override issues; ZTE Corporation, Sanechips
8. R2-2210301, Signalling based logged MDT override protection, Qualcomm Incorporated
9. R2-2208706, Report from SON/MDT session, Session chair (CMCC)