3GPP TSG-RAN WG2 Meeting #119bis Electronic R2-221xxxx

Online, 10 – 19 October 2022

**Agenda item: 8.13.4**

**Source: Nokia, Nokia Shanghai Bell**

**Title: Report on the email discussion [AT119bis-e][801][R17 SON/MDT] MDT override solution direction (Nokia)**

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

**Document for: Discussion and Decision**

# 1 Introduction

This document is to discuss solution direction for Signalling based Logged MDT configuration override protection, in inter-RAT scenario, according to the following scope:

* **[AT119bis-e][801][R17 SON/MDT] MDT override solution direction (Nokia)**

Compare the solution based on P2/3/4 in R2-2210797 with the solution in R2-2210301 and figure out the WF

Intended outcome: Report

Deadline: 04:44 UTC, Friday October 14th

Comments Deadline: 6:00PM UTC, Thursday October 13th

It collects summarizes proposals made in [1], [2], proposing to conclude how to achieve the override protection for LTE Logged MDT, when the UE moves to NR from LTE.

# 2 Contact List

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

|  |  |  |
| --- | --- | --- |
| **Company** | **Name** | **Email Address** |
| Nokia (Rapporteur) | Malgorzata Tomala | malgorzata.tomala@nokia.com |
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# 3 Discussion

## 3.1 Agreed solution baseline

In RAN2#119-e, the following agreement was made [10]:

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.

Number 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 majority of proposals were made for the Logged MDT configuration to support Signalling based MDT protection in inter-RAT scenario [1]. However, it was noted in [2], that the solution baseline if followed in inter-RAT scenario may impose significant UE complexity without much benefit, if adopted explicitly.

**Observation 1:** The agreement on adopting Rel-17 baseline to Rel-18 may result in different approaches for MDT configuration, reporting and data availability indication.

## 3.2 Alternate solutions for inter-RAT scenario

As noted in [2], there can be different methods defined to achieve LTE logged MDT configuration and report override protection:

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| L.p. | Methods | Pro | Cons |
| 1 | Override protection by simultaneous LTE and NR configuration –   * A UE capable of maintaining separate memory (UE variable for storing logged MDT report and configuration) for LTE and NR memory can signal this capability in UE capability signaling * The network should ensure signaling-based logged MDT override protection in respective RAT * NR cell does not need to know if UE is configured with LTE logged MDT and if UE has LTE logged MDT unretrieved report available. | Simple solution –   * Requires onetime indication – no indication required upon cell change * No need for cross-RAT signaling * No need for cross RAT report | No drawback - |
| 2 | Override protection by cross-RAT signaling but no cross-RAT reporting of LTE logged MDT report -   * A UE capable of sending cross-RAT signaling can indicate that it is capable of indicating if UE is previously configured with logged MDT configuration or it has unretrieved logged MDT data * No signaling for cross-RAT availability indication * Upon reception of such indication, gNB does not configure UE with NR-logged MDT configuration | Induce additional requirements at the UE, however,   * Can save UE memory if shared memory at the UE for NR and LTE * Less complexity than cross-RAT logged MDT reporting | Requires cross-RAT signaling –   * Involves UE complexity with cross-RAT signaling during **every cell change** * LTE spec change to indicate and store the information at the UE if an LTE configuration is signaling based configuration |
| 3 | Override protection by cross-RAT reporting of LTE logged MDT report -   * A UE capable of sending cross-RAT report can indicate that it is capable of indicating if UE is previously configured with logged MDT configuration or it has unretrieved logged MDT data * UE can additionally indicate if it supports cross-RAT reporting of LTE logged MDT from NR to LTE * gNB does not configure NR logged MDT until it extracts unretrieved logged MDT and until logged MDT configuration remains valid | No benefit | Significantly high complexity |

As further noted in Qualcomm’s contribution in [2], to achieve the override protection for LTE logged MDT report and configuration when UE moves to NR from LTE (when previously configured with logged MDT in LTE), the simplest method is the following:

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.

**Question 1**: Do you agree that nothing is required from the Network if override protection in inter-RAT scenario is realized by simultaneous LTE and NR configuration?

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| **Answers to Question 1 (If answered Yes – no need to answer to Q2)** | | |
| **Company** | **Yes/No** | **Technical Arguments** |
| Qualcomm | Yes | I believe the WID considers the LTE signaling-based logged MDT protection only when UE moves to NR, i.e. when UE moves within EUTRA cells LTE signaling-based logged MDT protection is not supported. If UE supports simultaneous LTE and NR configuration by allocating separate memory and as LTE signaling-based logged MDT protection is not supported within LTE mobility, override protection in the inter-RAT scenario is realized by simultaneous LTE and NR configuration without any signaling enhancements.  We may need a UE capability signaling enhancement as mentioned in our paper such that the network can know that UE is capable of handling override protection of LTE logged MDT configuration without network involvement. |
| ZTE | Yes | This method has least specs impact, which is also preferred by us if it is fine for UE vendors. |
| Huawei, HiSilicon | Comments | In the current 4G/5G specs, the UE only stores one set of logged MDT config/reports, and we think this is working assumption for some companies.  We think “simultaneous LTE and NR configuration” is one solution for solving the override protection in inter-RAT scenario. We have some comments on this direction:  Firstly, RAN2 can discuss the need and details, because it brings new impacts to UE side. For example, from storage point of view, a LTE logged MDT capable UE shall support 64kB memory for log storage, and a NR logged MDT capable UE shall supprot 64kB memory for log storage. Based on the current spec, if the UE supports both LTE logged MDT and NR logged MDT, the UE can support 64kB memory because the UE only stores one set of logged MDT config/reports. In other words, if “simultaneous LTE and NR configuration” is considered, the storage requirements will be different, which needs more discussions in RAN2. We are not sure whehter there are other RAN2 impacts or not.  Secondly, we wonder how it works, e.g.   * If it is optional with signalling, what are the network behaviours? If NR network receives the capability, the override issue is solved. If NR network does not receive the capability, what should the network do? * If it is optional without signaling, the network will have no idea how the override issue has been solved (which of Ues), and thus we are not sure whether it is acceptable or not |
| Samsung | No | As mentioned in [2] UE has to signal the capability for separate memory in UE capability signaling and the network should ensure signaling-based logged MDT override protection in respective RAT. So there will be an impact on the network- i.e. Network needs to handle the capability indicated by the UE and take actions accordingly.  In addition this is a big deviation from the existing MDT principles, that UE keeps only single MDT configuration which will cause critical UE burden. We understand that specification shall NOT mandate a UE supporting signaling-based logged MDT override protection in LTE shall also support two memory. So the network may need to support both the solutions to handle two different type of UEs, if the WI objectives have to be met. |
| Ericsson | See comment | We think UE capability handling is required for the network, but there might not be futher standard impact if we agree on Method 1. |
| Xiaomi | See comments | It depends on whether the intra-ETRAN override protection is supported or not. If it is supported, the logged MDT type indication is required for network at least.  From the UE perspecitive, maintaining two seperate logged MDT configurations deviates from current MDT principle, i.e. UE only maintain single MDT configuartion, and it also causes high burden for UE memory which is not expected for us. |
| CATT | See comment | We agree that Method 1 is a solution for inter-RAT signaling-based logged MDToverride protection, and less spec impact will be introduced for Method 1 compared with Method 2 and Method 3. However, as mentioned above by companies, some extra consideration e.g. UE capability etc. is needed as it is different from legacy mechanism i.e. only one configuration (NR or LTE logged MDT configuration) is maintained in UE storage. Maybe more evaluation is needed if we decide to go with Method 1. Actually, we prefer not to break the legacy mechanism. |
| Nokia | No | In our understanding in RAN, at least capability handling is required. Not clear if any impacts to CN, if the OAM would target the same user for Signalling based MDT from 4G and 5G |
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**Summary 1**: 2 (Qualcomm and ZTE) companies acknowledge nothing is required from the Network if override protection in inter-RAT scenario is realized by simultaneous LTE and NR configuration. 4 companies (Huawei, Ericsson, Nokia, CATT) observe there need to handle UE capability, once Method 1 is adopted. Though, it is regular procedural handling, there are further new impacts observed to the UE procedures and legacy principles, by 3 companies (Samsung, Xiaomi, Huawei). The latte

**Observation 1:** It is feasible to realise EUTRA MDT configuration override protection in inter-RAT scenario by simultaneous LTE and NR configuration, but network and UE impacts need further investigation.

**Proposal 1**: RAN2 will investigate UE and NW impacts due to EUTRA MDT configuration override protection in inter-RAT scenario realized by simultaneous LTE and NR configuration in the UE.

### 3.2.1 Configuration

Yet, alternatively, the solutions aiming to follow the Rel-17 baseline, proposed in [4], [5], [7], [8], led to the following collective proposals in [1]:

**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).

The rapporteur understanding is that the Proposal 2 and Proposal 3 (extension of the LTE configuration for Logged MDT) are overlapping with all the Methods: Method 1, Method 2 and Method 3, according to the requirements (copied from the above Table):

* The network should ensure signaling-based logged MDT override protection in respective RAT (Method 1)
* if UE is previously configured with logged MDT configuration (Method 2, Method 3)

However, [2] notes that only for above Methods 2 and 3, LTE specifications change is required to signal UE if a received logged MDT configuration is a signaling-based logged MDT configuration.

**Question 2**: Do you agree that in order to ensure signaling-based logged MDT override protection in E-UTRAN (intra-EUTRAN), the extension of the **LTE LoggedMeasurementConfiguration,** with Logged MDT type indication, would be required in any case?

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| **Answers to Question 2** | | |
| **Company** | **Yes/No** | **Technical Arguments** |
| Qualcomm | Please see comment | I believe proposals 2 and 3 are required for method 1 only if LTE signaling-based logged MDT override protection is supported within E-UTRAN (intra-EUTRAN), i.e., if LTE signaling-based logged MDT is configured at the UE then it cannot be overridden by LTE management based logged MDT. However, in my understanding, this is not within the scope of WI.  Therefore, based on current WID, i.e. override protection of LTE signaling-based logged MDT in NR, we do not need enhancements in proposals 2 and 3 if UE supports simultaneous LTE and NR configuration.  For methods 2 and 3, proposal 2 and proposal 3 will be required. |
| ZTE | See comments | As commented in Q1, to limit specs impact 1 is preferred, if method 1 is used , then no need to include MDT type in configuration. But for method 2/3 update LTE configuration to includes type information is needed since UE needs to know the MDT type to provide assistance information. |
| Huawei, HiSilicon | Yes | We agree that the above options would be required in any case, because:  The current specs require the UE to have only one set of logged MDT config/reports. For example, please find the text from TS 38.331 5.5a.2 Release of Logged Measurement Configuration The UE shall initiate the procedure upon receiving a logged measurement configuration in another RAT.    For Q1, if the UE capability is agreeable, it will be optional and the Rel-18 UE may or may not support it. If the UE does not support the new UE capability mentioned in Q1, some solutions are still needed to fix the problem. |
| Samsung | Yes |  |
| Ericsson | See comment | Intra-EUTRAN signalling based MDT protection seems to be out of the scope of the WID. Basing the discussion on the WID, we think Logged MDT type indication for this specific purpose is not needed. |
| Xiaomi | Yes |  |
| CATT | See comment | Same view as Ericsson. |
| Nokia | See comment | To fullfil the objective to protect E-UTRAN triggered Signalling based MDT, we were thinking the extension to LTE configuration message is needed, as otherwise, the UE can get overriten Signaling based MDT in E-UTRAN itself (by Management based MDT).  However, we are fine to limit LTE impacts and further work out Option 1 details |
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**Summary 2**: 4 (Qualcomm, ZTE, Ericsson, CATT) companies commented that  LTE LoggedMeasurementConfiguration extension with Logged MDT type indication is not needed if the Signalling based Logged MDT override protection in inter-RAT is realized by simultaneous LTE and NR configuration , 3 companies commented the the extenson is needed in any case (Samsung, Xiaomi, Huawei). 1 company (Nokia) had understanding the two alternates are feasible.

**Proposal 2**: FFS if the extension of the LTE LoggedMeasurementConfiguration **(**with Logged MDT type indication) is needed.

### 3.2.2 Reporting

Further, [2] notes that to achieve the override protection for LTE logged MDT report and configuration when UE moves to NR from LTE (when previously configured with logged MDT in LTE), the most complex solution is Method 3, with cross-RAT reporting.

In that context, the follow-up, collective proposal in [1] was 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.

The above Proposal doesn’t imply reporting yet, just availability of the data. However, the need for availability bit might be decided upon deciding the need for reporting in the other RAT.

In order, to model the reporting principles, it seems essential to prioritise one of the approaches, either:

* the UE should report E-UTRAN Logged MDT results in NR, or
* the UE shouldn’t report E-UTRAN Logged MDT results in NR.

**Question 3**: Do you agree that for LTE logged MDT configuration and report override protection in cross-RAT scenario it is beneficial to avoid of cross-RAT reporting of the Logged MDT data?

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| **Answers to Question 3** | | |
| **Company** | **Yes/No** | **Technical Arguments if NO** |
| Qualcomm | No | In my understanding, the WI objective is achieved without cross-RAT reporting of logged MDT data from LTE to NR.  The only benefit is that by retrieving LTE-logged MDT data, NR cells can configure UE with NR-logged MDT. This is not within the scope of WI and the complexity associated with this is significantly high. |
| ZTE | Yes for no need to introduce cross-RAT report. | Method 1 can already fulfil the objectives purpose, no need to complicate the solution. |
| Huawei, HiSilicon | Yes | We see that “cross-RAT reporting of logged data” will bring some compexities, so it should be avoided. |
| Samsung | See comments | We understand that cross-RAT reporting of Logged MDT will result in non-trivial ASN.1 changes and the benefits are not so obvious. We also need to discuss with RAN3 before making a conclusion, but we are ok to postpone the discussion to next meeting as well . |
| Ericsson | Cross-RAT reporting can be beneficial if method 1 is not chosen | If method 1 is chosen, we think cross-RAT reporting is not needed  If method 1 is not chosen, we think it is needed to fetch the lingering LTE MDT measurements in NR, otherwise, pending LTE MDT measurement in a UE connected to NR, leads to an in-efficient NR MDT mechanism i.e., NR node can not configure the UE with NR MDT configuration as long as UE keeps the LTE MDT report un-fetched. |
| Xiaomi | See comments | As the benefits to support the cross-RAT reporting of the Logged MDT data is not very clear yet and it needs to involve RAN3, we agree to postpone to the next meeting. |
| CATT | Yes | In order to avoid introducing more complexity, we prefer not to support cross-RAT reporting. |
| Nokia | Yes | We believe it much less complex approach if the cross-RAT reporting is avoided |
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**Summary 3**: 5 companies (Qualcomm, ZTE, Huawei, CATT, Nokia) see it is beneficial to avoid of cross-RAT reporting of the Logged MDT data. 1 company (Ericsson) see the avoidance of the cross-RAT reporting is reasonable in case simultaneous EUTRA MDT configuration override protection in inter-RAT scenario is realized by simultaneous LTE and NR configuration in the UE. 2 companies (Samsung and Xiaomi) see dependency on RAN3 discussions.

Due to limited complexity from specification perspective it is proposed to exclude cross-RAT reporting, which does not eliminate any configuraton approach (single RAT-specific configuration or simultaneous LTE and NR configurations). So that The baseline solution for EUTRA MDT configuration override protection in inter-RAT should assume that cross-RAT reporting for Logged MDT results is not supported:

**Proposal 3**: Cross-RAT reporting for Logged MDT results is not supported.

### 3.2.3 Solution direction

Analysis on the pros and cons of the alternate solutions, led in the contribution in [2] to the following proposal:

Proposal 1: RAN2 is requested to down-select one option among option 1 and option 2 by analyzing the pro and cons.

The observations, and assumptions made behind the proposal, clarified generic handling of the LTE and NR configurations, UE capabilities, storing principles as well as principles on what the UE should indicate to the Network. Given the overview sets a baseline for categorization of different directions, it is proposed to discuss companies preferences on the options.

**Question 4**: Do you agree RAN2 should work out detailed solution taking as a baseline one particular Option from Method 1, Method 2 and Method 3 in [2]?

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| **Answers to Question 4** | | |
| **Company** | **Yes/No** | **Technical Arguments** |
| Qualcomm | No | The UE implementation can be of two types:   1. separate memory allocation for LTE and NR logged MDT report 2. Common memory allocation for LTE and NR logged MDT report |
|  |  | If UE supports separate memory allocation for LTE and NR-logged MDT reports, then   * In our understanding, the standard should allow method 1.   If UE supports common memory allocation for LTE and NR-logged MDT reports, then   * In our understanding, then down the selection from methods 2 and 3 can be done by properly evaluating the signaling overhead and UE complexity. |
| ZTE | See comments | Method 1 has less specs impact, but it will have higher requirement and more memory at UE’s side, if it is acceptable for UE vendors then we are fine with only method 1. If it is not acceptable as a common solution, then we can work on also method 2 as well. |
| Huawei, HiSilicon | Yes | We see that many companies propose options, and we can have more discussions based on them. |
| Samsung | See comments | Method 1 is against the existing MDT principles that UE keeps only a single MDT configuration and would result in heavy UE burden. It also would lead to the agreed objectives of the WI not fulfilled in many cases and will also increase the network complexity. So we do not support this.  Method 1 also may deviate from the following RAN2 previous agreement " 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”.  We think that method 2 and method 3 are not complete solutions as it doesn’t consider the the intimation for signalling MDT configuration in LTE, like extension of the LTE LoggedMeasurementConfiguration. The difference between methods 2 and 3 are how to handle cross RAT reporting. Decision on Cross RAT reporting need to be decided after discussion with RAN3 and can be discussed later as we answered in Q3.  We prefer to keep the previous agreement and proceed by reusing the Rel-17 override protection solution, as below. We don’t think these are complex changes and hence there is no need to look for solutions which are completely different from existing MDT way.  1.UE informs eNB about its capability for override protection  2.eNB intimates UE about signalling MDT configuration  3.UE further informs gNB about the configuration, so that gNB can avoid override.  Details on reporting can be considered later. |
| Ericsson | Yes | We agree with Method 1, if chipset vendors agree on it.  If method 1 is not chosen, method 3 is preferred, as without cross-RAT reporting NR MDT mechanism is under-utilized and inefficient i.e., NR network is not able to configure MDT configuration as long as LTE MDT report is pending/unfetched at the UE. |
| Xiaomi | See comments | Method 1 is not preferred to us as it causes burden on UE memory and deviate from the existing MDT principle.  We are open to method 2 and method 3, the decision can be postpone to next meeting to have further analysis. |
| CATT | Yes | We prefer to take R17 solution as baseline and achieve a simpler inter-RAT signaling-based logged MDT override protection. So, Method 2 is more acceptable for us. |
| Nokia | Yes | We are open to discuss Method 1 and Method 2, as Method 3 seems the most complex in terms of handling the reports that were scheduled by other RAT. |
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**Summary 4**: There is no convergency on the way forward. 3 companies are supporting simultaneous UE configuration in LTE and NR (Qualcomm, ZTE, Ericsson). 3 companies  (Samsung, CATT, Xiaomi) are not in favour of the method, as it changes the legacy framework in the UE i.e. only one RAT-specific MDT configuration. 2 companies (Huawei, Nokia) are open for further evalution of all the methods.

Therefore, all the approaches for configuration and MDT context handling are still possible to be pursued:

**Proposal 4**: Decision on MDT configuration handling in inter-RAT scenario (whether the UE keeps one or two contexts) is postponed to the next meeting.

# 4 Conclusion

This document has made the following proposals:

**Proposal 1**: RAN2 will investigate UE and NW impacts due to EUTRA MDT configuration override protection in inter-RAT scenario realized by simultaneous LTE and NR configuration in the UE.

**Proposal 2**: FFS if the extension of the LTE LoggedMeasurementConfiguration **(**with Logged MDT type indication) is needed.

**Proposal 3**: Cross-RAT reporting for Logged MDT results is not supported.

**Proposal 4**: Decision on MDT configuration handling in inter-RAT scenario (whether the UE keeps one or two contexts) is postponed to the next meeting.

# References

1. R2-2210797, Summary on 8.13.3 ‘MDT override’, Nokia
2. R2-2208161; Signalling based logged MDT override protection; Qualcomm Incorporated
3. R2-2209570, Discussion on Inter-RAT Signaling Based Logged MDT Override Protection; CATT
4. R2-2209808, Inter-RAT signalling based logged MDT override protection, Samsung R&D Institute India
5. R2-2209896, Discussion on the inter-system signalling based MDT override protection; Huawei, HiSilicon
6. R2-2210028, Considerations on the signaling based logged MDT override protection for E-UTRAN; Beijing Xiaomi Software Tech
7. R2-2210182, MDT enhancements; Ericsson
8. R2-2210267, Signalling based Logged MDT override protection; Nokia, Nokia Shanghai Bell
9. R2-2210288, Consideration on MDT override issues; ZTE Corporation, Sanechips
10. R2-2208706, Report from SON/MDT session, Session chair (CMCC)