**3GPP TSG-RAN RAN2 #123bis R2-23xxxxx**

**Xiamen, China, 9 – 13 October, 2023**

**Agenda Item:**  **7.13.7**

**Source: Huawei (email rapporteur)**

**Title:** **Pre-meeting summary of 7.13.7**

**Document for: Discussion and Decision**

# 1 Introduction

This is the email report of pre-meeting summary for 7.13.7 SON/MDT enhancements for Non-Public Networks.

According to Skeleton v2, the relevant Tdocs are listed below:

**7.13.7 SON/MDT enhancements for Non-Public Networks**

[1] R2-2310050 Discussion on the SONMDT enhancement for NPN Xiaomi

[2] R2-2310261 SONMDT enhancement for NPN CMCC

[3] R2-2310343 Out-of-coverage in NP Apple

[4] R2-2310368 SON and MDT Enhancement for NPN CATT

[5] R2-2310445 Summary of [Post123][559][R18 SONMDT] Open issues of SONMDT for NPN (CATT) CATT

[6] R2-2310505 Discussion on leftover issues for SONMDT enhancements for NPN Huawei, HiSilicon

[7] R2-2310568 Consideration on SON-MDT support for NPN ZTE Corporation, Sanechips

[8] R2-2310598 SON/MDT enhancements for NPN Samsung

[9] R2-2310747 SON Support for NPN Ericsson

In addition, for the following 2 Tdocs under 7.14.1 Organizational, the email rapporteur suggests to summarize them here as they are relevant to SON enhancements for NPN.

[10] R2-2309442 LS on MDT for NPN (R3-234744; contact: Ericsson) RAN3 LS in Rel-18 NR\_ENDC\_SON\_MDT\_enh2-Core To:RAN2, SA5

[11] R2-2310498 Discussion on 38.331 issues for NPN Huawei, HiSilicon

# 2 Discussion

## 2.1 Open issues of SONMDT for NPN

At RAN2#123 meeting, open issues were identified, and some progress were made in [5]. So it is suggested to firstly discuss proposals in [5].

**Proposal 1: RAN2 to discuss proposals in R2-2310445.**

In [11], the CR rapporteur provides a discussion paper on 38.331 issues. In addition, in [4], there are also some proposals related to 38.331 running CR, which can be also discussed.

For the details of RLF/HOF report and logged MDT

**Proposal 2: RAN2 to discuss whether ESNPN can be applied to RLF/HOF report besides the Logged MDT:**

* **Option 1: Limit RLF/HOF record and report to the registered SNPN, one *nid* is enough;**
* **Option 2: ESNPN is supported for RLF/HOF report, and separate *nid(s)* may need in the RLF/HOF report to identify the other part of SNPN IDs for different usage, together with the different PLMN ID part in e.g.** ***previousPCellId-r16, failedPCellId-r16, reconnectCellId-r16* and *reestablishmentCellId-r16*.**

**Proposal 3: RAN2 to discuss which and how to report the list of SNPN IDs in the logged MDT report:**

* **Option 1: Registered SNPN ID in which the RLF/HOF occurred inside each entry of *logMeasInfoList;***
* **Option 2: ESNPN list outside the *logMeasInfoList;***
* **Option 3: All registered SNPN IDs in which the RLF/HOF occurred as a list (without duplication) outside the *logMeasInfoList.***

**Proposal 4: A critical extension (i.e.** ***AreaConfiguration-r18*) can be considered in R18 for the PNI-NPN area scope in logged MDT configuration for mistake correction and to cover all configuration possibilities.**

**Proposal 5: RAN2 should include the 3 cases of cell based/TAI based/SNPN list based SNPN related area scopes in the logged MDT configuration and a critical extension (i.e.** ***AreaConfiguration-r18*) can be considered in R18.**

## 2.2 For the RAN3 LS [10]

In RAN3 LS [10], the following action was mentioned:

**To RAN2 and SA5**

**ACTION: RAN3 would like to ask RAN2 and SA5 to take the above into account, to apply corresponding modification to their specifications, if needed, and to provide feedback on the progress achieved so far on MDT for NPN, if any**

For this meeting, [10] provides some analysis as well as proposals, which can be discussed.

**Observation 1 RAN2 running CR has implemented changes mirroring RAN3 implementation of PNI-NPN Based MDT and SNPN Based MDT.**

**Observation 2 In the network provides SNPN cell ID or TAI as part of area configuration, i.e., in “SNPN Cell Based MDT” and “SNPN TAI Based MDT” checking the NID when logging MDT measurement is not needed.**

**Proposal 6 RAN2 requests RAN3 to revert their implementation on configuring SNPN Cell Based MDT and SNPN TAI Based MDT configuration.**

**Proposal 7 RAN2 can send a reply LS to RAN3 including RAN2 views.**

## 2.3 Other proposals from companies

The following table captures other proposals from companies, and the comments from the email rapporteur are also added.

In summary, most of proposals have been covered by the summary [5], while CEF/RA report related proposals may be discussed after the discussion of [5]. Some proposals are about stage-3 details, which are moved to section 2.1. Some proposals are relevant to the RAN3 LS [10], which are moved to section. There are also some proposals on new enhancements, which should be de-prioritized from the email rapporteur’s point of view. Therefore, there are no proposals in this section.

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| --- | --- | --- |
| **Tdoc** | **Proposal** | **Comments** |
| [1], Xiaomi | **Proposal 1: UE includes the CAG-only indication into the RLF/HOF report.****Proposal 2: RAN2 confirms to have no enhancements for the loss issue of logged MDT when UE switches between SNPN and PN.****Proposal 3: The UE access mode can be reported along with the existing OOC indication for the network analysis of the coverage hole.** | Already covered by the summary [5] |
| [2], CMCC | **Proposal 1: Include the CAG ID in RLF report.****Observation 1: The CAG subscription information can be obtained from the network as the network will store the UE CAG subscription information if UE supports CAG.****Proposal 2: If CAG ID is included in RLF report, it’s no need to include UE CAG subscription information in RLF report.****Proposal 3: Not enhance the MDT mechanism to avoid losing of logged MDT report when UE switches between SNPN and PN in R18, and no need to introduce a separate SNPN specific UE variable.****Proposal 4: No more SON/MDT enhancements for NPN in this Release.** | Already covered by the summary [5] |
| [3], Apple | **Observation 1: OOC is a major issue which radically affects user experience.****Observation 2: unlike PLMN, in NPN, a UE with “CAG-only indication” may be OOC in an area where the operator has “regular” (i.e. non-CAG) infrastructure and therefore could resolve the issue with just network (re)configuration.****Observation 3: the issue could be resolved via MDT, however MDT is almost never deployed.** **Proposal 1: to address the NPN OOC issue with relevant SON enhancements.** **Proposal 2: to extend the RLF-Report to cover NPN OOC scenario.****Proposal 3: upon T311 timer expiry, if the UE found a cell which would otherwise be suitable, but is not considered so due to NPN restrictions, the UE sets in VarRLF-Report the information about that cell.** | Already covered by the summary [5] |
| [4], CATT | For the details of RLF/HOF report and logged MDT**Proposal 1: RAN2 to discuss whether ESNPN can be applied to RLF/HOF report besides the Logged MDT:*** **Option 1: Limit RLF/HOF record and report to the registered SNPN, one *nid* is enough;**
* **Option 2: ESNPN is supported for RLF/HOF report, and separate *nid(s)* may need in the RLF/HOF report to identify the other part of SNPN IDs for different usage, together with the different PLMN ID part in e.g.** ***previousPCellId-r16, failedPCellId-r16, reconnectCellId-r16* and *reestablishmentCellId-r16*.**

**Proposal 2: RAN2 to discuss which and how to report the list of SNPN IDs in the logged MDT report:*** **Option 1: Registered SNPN ID in which the RLF/HOF occurred inside each entry of *logMeasInfoList;***
* **Option 2: ESNPN list outside the *logMeasInfoList;***
* **Option 3: All registered SNPN IDs in which the RLF/HOF occurred as a list (without duplication) outside the *logMeasInfoList.***

*Observation 1: Current R17 non-critical extension of the area configuration has some mistake, and the* *representation methods of the “PLMN wide” used by RAN2 and RAN3 are different which may cause scenarios misalignment after introducing the NPN related area scope configuration.***Proposal 3: A critical extension (i.e.** ***AreaConfiguration-r18*) can be considered in R18 for the PNI-NPN area scope in logged MDT configuration for mistake correction and to cover all configuration possibilities.****Proposal 4: RAN2 should include the 3 cases of cell based/TAI based/SNPN list based SNPN related area scopes in the logged MDT configuration and a critical extension (i.e.** ***AreaConfiguration-r18*) can be considered in R18.**For consideration of CEF and RA report*Observation 2: Legacy CEF report does not support the EPLMN.***Proposal 5: Do not support ESNPN for CEF report involving NPN networks.****Proposal 6: Add NID for CEF report involving NPN networks.****Proposal 7: SNPN ID checking with the stored SNPN ID in the UE variable is needed before sending the availability indication and before sending the CEF report.****Proposal 8: Adopt the same ESNPN application rules of RLF/HOF report for RA report.****Proposal 9: Do not introduce NPN ID into RA report.****Proposal 10: SNPN ID checking is needed before sending the RA report.** | P1, P2, P3, P4 are about stage-3 details, which can be discussed as part of section 2.1.P5, P6, P7 are about CEF enhancements for NPN. These proposals may be discussed after the discussion of the summary [5].P8, P9, P10 are about RA report enhancements for NPN. These proposals may be discussed after the discussion of the summary [5]. |
| [6], Huawei | **Observation 1: There is no strong motivation to introduce UE CAG subscription or CAG-only indication in RLF/HOF report.****Observation 2: For the loss issue of logged MDT report, the priority between logged measurements for PN and logged measurements for SNPN may need to be clarified.****Observation 3: Existing information can be already used to indicate OOC for NPN.** | Already covered by the summary [5] |
| [7], ZTE | *Observation 1: UE may not be able to reconnect or set-up new connection to a cell due to lack of CAG cells deployed near by, it can imply a mismatch between NPN network deployment and UE requirements.***Proposal 1: UE includes the CAG-only indication (if configured) in the RLF/HOF Report.***Observation 2: For NPN UE will goes to any cell selection state due to being barred on all frequencies when the strongest/highest Ranked cells of all of the frequencies doesn’t belong to allowed NPN network.**Observation 3: An NPN UE can still experience normal OOC when there is no cell with quality good enough for UE to camp on, which is due to actual coverage problem.**Observation 4: Information on further OOC cause value could be beneficial in logged MDT report logged in NPN, which can help NW to know whether to fix the coverage problem or whether to optimize NPN deployment for UE.* **Proposal 2: Supports further differentiation OOC cause (e.g., whether due to weak coverage or due to cell being barred) when logging any cell selection state in NPN MDT results.**  | Already covered by the summary [5] |
| [8], Samsung | **Proposal 1: CAG only indication is not included in RLF/HOF.****Proposal 2: Common report is used for PN and PNI-NPN.****Observation 1: Loss of logged MDT reports collected in SNPN if the UE registers in a PLMN before the reports are retrieved is a corner case.****Observation 2: Any effective solution for loss of logged MDT reports collected in SNPN will be complex and is infeasible in R18, for e.g. a solution similar to LoggedMDT enhancements may be needed to completely resolve this corner case.****Proposal 3: Keep the existing principle that UE releases any logged MDT report after deregistration for NPN.****Proposal 4: There is no use for including NID/CAG-ID in RA Report or CEF report.****Proposal 5: RAN2 can further discuss NPN ID checking for availability and reporting for RA report/CEF report. Impacts due to E-SNPN, if any, needs to be kept minimum.** | P4, P5 are about CEF/RA report enhancements for NPN. These proposals may be discussed after the discussion of the summary [5].Others have been already covered by the summary [5] |
| [9], Ericsson | In the previous sections we made the following observations:[Observation 1 Inclusion of CAG information in RLF/HOF report may be used for observability purpose but has no clear benefit for MRO.](#_Toc146778929)[Observation 2 CAG subscription status is not known in RAN and may be subject to user privacy.](#_Toc146778930)[Observation 3 A SNPN user (holding an SNPN allowed UE) may move frequently between SNPN and PN which may ruin collected measurements for one network in the other networks.](#_Toc146778931)[Observation 4 The current logged MDT framework is wasteful when PN and SNPN co-exist.](#_Toc146778932)[Observation 5 RAN2 running CR has implemented changes mirroring RAN3 implementation of PNI-NPN Based MDT and SNPN Based MDT.](#_Toc146778933)[Observation 6 In the network provides SNPN cell ID or TAI as part of area configuration, i.e., in “SNPN Cell Based MDT” and “SNPN TAI Based MDT” checking the NID when logging MDT measurement is not needed.](#_Toc146778934)[Observation 7 If a UE served by PN, registers to SNPN and later returns to PN, it is unclear what is logged and reported by the UE in the MHI.](#_Toc146778935)[Observation 8 It is agreed that the UE performs SNPN ID checking before transmitting the information for corresponding SON and MDT reports, upon the network requests for it.](#_Toc146778936)[Observation 9 UE only logs the PCI and the radio measurements of the neighboring cells in the logged MDT report.](#_Toc146778937)[Observation 10 From the current logged MDT reports it is impossible for the network to deduce if the provided coverage is by a PN or an NPN cell.](#_Toc146778938)[Observation 11 As of now, building coverage map for an area (including both PN and NPN coverage) can be misleading for coverage analysis purpose, as MDT reports does not reflect the cell type (e.g., PN or NPN type), and a coverage of NPN maybe counted as coverage of PN and vice versa. Note that neighbouring cells measurement in MDT reports includes only PCI info of the cell.](#_Toc146778939)Based on the discussion in the previous sections we propose the following:[Proposal 1 Upon logging the RA report for a new SNPN, the UE deletes the existing RA reports belonging to the previous SNPNs/PLMN.](#_Toc146778940)[Proposal 2 UE logs NID in the RA report.](#_Toc146778941)[Proposal 3 UE does not add CAG information in the RLF/HOF report.](#_Toc146778942)[Proposal 4 Upon moving to SNPN (and deregistration in PN) UE stores logged MDT report collected in PN in a separate variable and releases the MDT configuration received in PN.](#_Toc146778943)[Proposal 5 RAN2 to agree on the draft LS reply in the Annex.](#_Toc146778944)[Proposal 6 RAN2 discuss whether to consider additional memory (e.g., additional 64KB) for storing the PLMN MDT measurements when going to SNPN network.](#_Toc146778945)[Proposal 7 RAN2 requests RAN3 to revert their implementation on configuring SNPN Cell Based MDT and SNPN TAI Based MDT configuration.](#_Toc146778946)[Proposal 8 RAN2 to agree on the draft LS reply in the Annex.](#_Toc146778947)[Proposal 9 RAN2 discuss to log an SNPN out-of-coverage (OoC) indication either in](#_Toc146778948)[a. an RA report, or](#_Toc146778949)[b. a CEF report, or](#_Toc146778950)[c. a new report.](#_Toc146778951)[Proposal 10 UE logs time spent in the SNPN network in an entry in the existing PN MHI report.](#_Toc146778952)[Proposal 11 RAN2 agree that MHI of PLMN should not be reported to the SNPN i.e., PLMN check is needed before MHI availability indication to the network.](#_Toc146778953)[Proposal 12 RAN2 agree that MHI of the SNPN should not be reported to the PLMN i.e., SNPN checking is needed before MHI availability indication to the network.](#_Toc146778954)[Proposal 13 RAN2 to enhance the logged MDT report with cell type indication (e.g., NPN cell) as part of the measurement results.](#_Toc146778955)[Proposal 14 RAN2 enable MDT measurements in UEs in anyCellSelection state in NPN network.](#_Toc146778956)[Proposal 15 UE in *anyCellSelection* state logs cell identity and measurements of the last suitable cell if the CAG identities broadcasted by the cell that is part of the *CAGConfigList* received in *LoggedMeasurementConfiguration*.](#_Toc146778957)[Proposal 16 RAN2 to enhance the MDT configuration (*interFreqTargetInfo*) to enable logging only NPN or PN cells per frequency.](#_Toc146778958) | P1, P2 are about NPN for RA report. These proposals may be discussed after the discussion of the summary [5].P10, P11, P12 are about enhancements to MHI.P13, P14, P15, P16 are about building coverage map for NPN and PN.P10 ~ P16 are not in the open issue list (made at RAN2#123 meeting), so they are de-prioritized.P7, P8 are discussed in section 2.2 (relevant to the RAN3 LS [10]).The following proposals have been covered by the summary [5]:P3, P4, P5, P6, P9 |

# 3 Conclusion

For open issues of SONMDT for NPN, there are the following proposals:

**Proposal 1: RAN2 to discuss proposals in R2-2310445.**

**Proposal 2: RAN2 to discuss whether ESNPN can be applied to RLF/HOF report besides the Logged MDT:**

* **Option 1: Limit RLF/HOF record and report to the registered SNPN, one *nid* is enough;**
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For the RAN3 LS [10], there are the following observations and proposals:

**Observation 1 RAN2 running CR has implemented changes mirroring RAN3 implementation of PNI-NPN Based MDT and SNPN Based MDT.**

**Observation 2 In the network provides SNPN cell ID or TAI as part of area configuration, i.e., in “SNPN Cell Based MDT” and “SNPN TAI Based MDT” checking the NID when logging MDT measurement is not needed.**

**Proposal 6 RAN2 requests RAN3 to revert their implementation on configuring SNPN Cell Based MDT and SNPN TAI Based MDT configuration.**

**Proposal 7 RAN2 can send a reply LS to RAN3 including RAN2 views.**