3GPP TSG-RAN WG2 Meeting #120 R2-221XXXX

Toulouse, France, 14 – 18 November 2022

**Agenda item: 8.13.7**

**Source: Nokia, Nokia Shanghai Bell**

**Title: Report about [Pre120][802][R18 SONMDT] SON/MDT enhancement on NPN (Nokia)**

**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 AI 8.13.7:

[1] R2-2211354 SON and MDT Enhancement for NPN CATT

[2] R2-2212093 SON support for NPN Ericsson

[3] R2-2212223 Discussion on SONMDT enhancements for NPN Huawei, HiSilicon

[4] R2-2212250 CAG IDs in SON/MDT Nokia, Nokia Shanghai Bell

[5] R2-2212286 Consideration on SON-MDT support for NPN ZTE

[6] R2-2212299 SON/MDT enhancements for NPN Samsung R&D Institute India

[7] R2-2212627 SONMDT enhancement for NPN CMCC

[8] R2-2212643 Further discussion on SON for NPN vivo

[9] R2-2212670 Discussion on SON/MDT enhancements for Non-Public Networks Qualcomm Incorporated

[10] R2-2212739 Discussion on the SONMDT enhancement for NPN Xiaomi

The agreements from RAN2#119bis-e have also been considered during the creation of the summary:

Agreements:

1 SNPN ID (e.g.,NID ID) checking is needed before sending the availability indication for corresponding SON and MDT report. The details can be discussed case by case. FFS PNI-NPN ID checking.

2 Include the NPN ID into SON/MDT report, whether SNPN ID or PNI-NPN ID related info should be included can be discussed per use case.

3 RAN2 prioritizes the use cases of RLF report and logged MDT enhancement for NPN.

# 2 Discussion

## 2.1 NPN ID checking before sending availability indication of a report

The following proposals are made in this area

1. [1] Proposal 4: Only the SNPN ID checking is needed before sending the RLF/HOF report availability indication related to NPN network.
2. [1] Proposal 7: Only the SNPN ID checking is needed before sending the logged MDT availability indication related to NPN network.
3. [3] Proposal 1: PNI-NPN ID checking on SON reports are not needed.
4. [3] Proposal 4: PNI-NPN ID checking on logged MDT reports are not needed.
5. [4] Proposal 1: There is no need to check the CAG ID before reporting about the availability of logged MDT and RLF report(s).
6. [7] Proposal 1: The PNI-NPN ID checking, e.g. CAG Identifier, is needed before sending the availability indication for corresponding SON and MDT report.
7. [8] Proposal 1: The following steps can be adopted for SNPN ID checking before sending the availability indication for RLF report:
	* UE shall store registered SNPN (i.e, PLMN ID and NID) in *VarRLF-Report* when determining the content of RLF report;
	* If the registered SNPN is the same as the stored SNPN in *VarRLF-Report* and if the UE has radio link failure or handover failure information available in *VarRLF-Report*, UE shall include the available indication of RLF report in the RRC Complete message.
8. [8] Proposal 2: SNPN ID checking is needed before sending the information for the corresponding SON and MDT reports.
9. [8] Proposal 3: PNI-NPN ID checking is not needed before sending the availability indication and the information for the corresponding SON and MDT report
10. [9] Proposal 1: CAG ID checking is not required before sending the availability indication at the UE before reporting SON/MDT reports.

**Rapporteur's summary:** The proposals in this area are focusing whether the SNPN ID (NID) and PNI-NPN ID (CAG ID) should be checked by the UE before sending a report availability to the network. At the RAN2#119bis-e it was agreed that *"SNPN ID (e.g.,NID ID) checking is needed before sending the availability indication for corresponding SON and MDT report".* Rapporteur's view is that no need to confirm of this agreement, only the checking of PNI-NPN ID, which was left FFS, should be discussed. Most of the proposals (1, 2, 3, 4, 5, 9, 10 vs 6) state that no checking of the PNI-NPN (CAG ID) is needed. Rapporteur's proposal is that the details of the checking to be discussed at future meetings after it is agreed what is to be checked.

Based on this summary the following proposals are to be discussed:

**Proposal 1.1: PNI-NPN (CAG) ID checking is NOT performed before sending the RLF/HOF report availability indication related to a PNI-NPN network.**

**Proposal 1.2: PNI-NPN (CAG) ID checking is NOT performed before sending the logged MDT availability indication related to a PNI-NPN network.**

**Proposal 1.3: Details of the checking of NPN IDs (e.g., Proposal 1 of R2-2211354) are FFS.**

## 2.2 Adding NPN ID(s) into a report

The following proposals are made in this area

1. [1] Proposal 3: Introduce NID/CAG-ID into the RLF/HOF Report to indicate UE NPN access limit.
2. [1] Proposal 8: It is not necessary to add NPN related information e.g. NID/CAG-ID into the logged MDT result.
3. [2] Proposal 5: RAN2 enhance the logged MDT report with cell type indication (e.g., SNPN cell) as part of the measurement results.
4. [3] Proposal 2: Include both NID and CAG in the RLF report.
5. [3] Proposal 5: Include both NID and CAG in logged reports.
6. [4] Proposal 2: There is no need to provide CAG ID in logged MDT and RLF report(s).
7. [5] Proposal 1: For logged MDT in SNPN, UE stores SNPN ID in logged MDT results
8. [5] Proposal 4: If configured with CAG list in areaConfiguration, CAG IDs in included in logged MDT results
9. [5] Proposal 9: To support logging RLF report in SNPN, CGI-Info-logging is enhanced to allow logging PLMNs and cell identity included in npn-IdentityInfoList of SIB1 in CGI-Info-logging
10. [6] Proposal 2: For SNPN, npn-IdentityList is included in VarLogMeasReport or VarRLF-Report
11. [6] Proposal 3: RAN2 to discuss whether to include plmn-IdentityList or npn-IdentityList in VarLogMeasReport or VarRLF-Report.
12. [7] Proposal 2: The PNI-NPN ID, e.g. CAG Identifier, is added for the SON/MDT report for CAG cell
13. [7] Proposal 3: The SNPN ID, e.g. network identifier (NID), is added for the SON/MDT report for SNPN cell
14. [8] Proposal 5: The NPN information of the cell, e.g., NID or CAG list, should be included in the RLF report
15. [9] Proposal 2: To represent the global cell identity of a PNI-NPN cell, UE can include the CAG-ID in the existing CGI-Info-Logging
16. [9] Proposal 12: To represent the global cell identity of an SNPN cell, UE can include the NID in the existing CGI-Info-Logging.

**Rapporteur's summary:** The proposals in this area are focusing whether the SNPN ID (NID) and PNI-NPN ID (CAG ID) should be added into logged MDT and RLF/HOF report. Rapporteur's proposal is to make decisions on the basic principle of adding the new identities and further discuss the details (e.g., how to include them) at future meetings. The companies that made proposals have the following views:

- Introducing SPNP ID (e.g., NID) to RLF/HOF report is supported by 6 companies (CATT, Huawei, Samsung, CMCC, Vivo, Qualcomm), while no company proposed not to introduce it.

- Introducing SPNP ID (e.g., NID) to logged MDT report is supported by 5 companies (Huawei, ZTE, Samsung, CMCC, Vivo) while 1 company (CATT) proposed not to add it.

- Adding PNI-NPN ID (e.g., CAG ID) to RLF/HOF report is supported by 5 companies (CATT, Huawei, CMCC, Vivo, Qualcomm), while 1 company (Nokia) proposed not to add it. One company (Samsung) requested further discussion on this issue.

- Adding PNI-NPN ID (e.g., CAG ID) to logged MDT report is supported by 3 companies (Huawei, CMCC, Vivo), while 2 companies (CATT, Nokia) proposed not to add it. One company (Samsung) requested further discussion on this issue, and one company proposed it conditionally (ZTE)

As only few companies have proposals on this area, this summary cannot reflect any majority view of the companies.

Based on this summary the following proposals are to be discussed:

**Proposal 2.1: Introduce SPNP ID (e.g., NID) to RLF/HOF report. Details of how to introduce it are FFS.**

**Proposal 2.2: Introduce SPNP ID (e.g., NID) to logged MDT report. Details of how to introduce it are FFS.**

**Proposal 2.3: Introduce PNI-NPN ID (e.g., CAG ID) to RLF/HOF report. Details of how to introduce it are FFS.**

**Proposal 2.4: Introduce PNI-NPN ID (e.g., CAG ID) to logged MDT report. Details of how to introduce it are FFS.**

## 2.3 Logged MDT configuration for NPNs

The following proposals are made in this area

1. [1] Proposal 5: RAN2 to assume only the UE registered in SNPN can be configured with this SNPN related logged MDT, and the NID is not necessary to be indicated in the area configuration.
2. [1] Proposal 6: Add PNI-NPN related information i.e. CAG ID (list) in the area configuration for logged MDT after SA3 confirming the NPN ID transmission to NG-RAN in NGAP.
3. [2] Proposal 6: RAN2 enhance the MDT configuration (interFreqTargetInfo) to enable logging only NPN or PN cells per frequency.
4. [3] Proposal 3: A CAG list for MDT area scope should be included in MDT area configuration.
5. [4] Proposal 3: Add CAG ID in the area configuration for logged MDT.
6. [5] Proposal 2: areaConfiguration is enhancement to allow configuring SNPN cell(s) identified by SNPN ID(s).
7. [5] Proposal 3: areaConfiguration of logged MDT configuration is enhanced to allow include CAG list.
8. [6] Proposal 1: LoggedMeasurementConfiguration can configure npn-IdentityList for SNPN and either plmn-identityList or npn-IdentityList for PNI-NPN
9. [7] Proposal 4: For Logged MDT, extend the constituent of the logging area with a list of NPN identities
10. [8] Proposal 4: RAN2 to wait for RAN3 progress on MDT area scope configuration
11. [9] Proposal 3: In Rel-18, PLMN-wide measurement logging (irrespective of CAG or Non-CAG cells) is supported by existing LoggedMeasurementConfiguration
12. [9] Proposal 4: In rel-18, for supporting configuration for measurement logging on a subset of CAG and non-CAG cell and/or frequency lists, the area configuration may include both CAG and non-CAG specific cells and interFrequencyTarget list.
13. [9] Proposal 5: In rel-18, for supporting measurement logging on only CAG-Cell, an indication can be used in area configuration.
14. [9] Proposal 6: In rel-18, for supporting configuration for measurement logging on a subset of CAG cells and/or frequency lists, the area configuration may include only CAG-specific cell and interFrequencyTarget list.
15. [9] Proposal 7: in rel-18, for supporting measurement logging on only non-CAG-Cell, an indication can be used in area configuration.
16. [9] Proposal 8: In rel-18, for supporting configuration for measurement logging on a subset of CAG cells and/or frequency lists, the area configuration may include only non-CAG specific cell and interFrequencyTarget list.
17. [9] Proposal 9: Maximum number of cells remains 32 irrespective of whether the network configures CAG only, non-CAG only, or both CAG and non-CAG cells in area configuration.
18. [9] Proposal 10: Maximum number of cells in InterFreqTargetInfo remains 32 irrespective of whether the network configures CAG only, non-CAG only, or both CAG and non-CAG cells in area configuration.
19. [9] Proposal 11: Maximum number TrackingAreaCode and TrackingAreaIdentityList remains at 8 irrespective of whether the network configures CAG only, non-CAG only, or both CAG and non-CAG cells in the area configuration.
20. [9] Proposal 13: A single SNPN is configured in LoggedMeasurementConfiguration for SNPN.
21. [10] Proposal 1: Introduce the MDT NPN list in the logged MDT configuration to indicate the NPNs where measurement collection and log reporting is allowed
22. [10] Proposal 2：Introduce the NPN related information in the logging area configuration to restrict the measurement logging to specific NPN cell/tracking areas

**Rapporteur's summary:** Most of the proposals are focusing whether to enable the use of NIDs, and CAG IDs in logged MDT configuration. Rapporteur's understanding is that most of the companies are supportive of the introduction of NID and CAG ID into the logged MDT configuration. Some proposals further discuss the details of how to introduce them. Proposals from [9] (17, 18, 19) are targeting to clarify that even the introduction of the new configuration parameters should not increase the maximum number of configuration information elements. Rapporteur's view is that the basic principle of introducing the NPN IDs in logged MDT configuration should be concluded before the details (e.g., how to introduce, what are the limitations) are discussed.

Based on this summary the following proposals are to be discussed:

**Proposal 3.1: Introduce SPNP ID (e.g., NID) into logged MDT configuration. Details of logged MDT configurations for SNPNs are FFS.**

**Proposal 3.2: Introduce CAG ID into logged MDT configuration. Details of logged MDT configurations with CAG IDs are FFS.**

## 2.4 Storage of NPN specific measurements in UEs

The following proposals are made in this area

1. [1] Proposal 2: Not to introduce separate SON/MDT related UE variable(s) for SNPN or for PNI-NPN.
2. [2] Proposal 1: UE logs SON reports for SNPNs in separate variables.
3. [2] Proposal 2: UE logs MDT report for SNPNs in a separate variable.
4. [2] Proposal 3: RAN2 discuss whether to consider additional memory e.g., additional 64KB memory for the SNPN MDT report or share the existing memory between SNPN and PN reports.
5. [5] Proposal 7: For SNPN, no need to further address co-existence of PN and SNPNs logging in logged MDT.
6. [5] Proposal 8: For PNI-NPN co-existence of PN and PNI-NPNs logging in logged MDT is postponed to until SA3 concludes on the user consent.
7. [6] Proposal 4: Common report is used for PN and NPN.
8. [9] Proposal 15: UE suspends logging the measurement if UE moves to PN.
9. [9] Proposal 16: UE clears SNPN logged MDT report and configuration if a new configuration is received from another SNPN or PN.

**Rapporteur's summary:** Based on these proposals the rapporteur's understanding is that the views on introducing new variables for NPNs are quite diverging.

Based on this summary the following proposals are to be discussed:

**Proposal 4.1: Discuss whether to introduce of new NPN specific variables for PNI-NPNs.**

**Proposal 4.2: Discuss whether to introduce of new NPN specific variables for SNPNs.**

## 2.5 Other proposals

The following other proposals are made in this area

1. [1] Proposal 1: To analyse the NPN related impact or enhancement for the SON or MDT procedures, the observations above are for information and should be considered.

Observation 1: There is no explicit NPN supported capability in AS, both NPN capable UE and non-NPN capable UE can report the unique NPN related AS capability of “nr-CGI-Reporting-NPN-r16”.

Observation 2: Whether a UE can select a SNPN cell only depends on the SNPN access mode set by NAS.

Observation 3: Whether a UE can select a PNI-NPN cell depends on the Allowed CAG list and the optional CAG-only indication set by NAS.

1. [1] Proposal 9: Report the NPN related information to the TCE together with the L2 measurement, e.g. throughput or data volume measurement.
2. [1] Proposal 10: No need to perform NPN related enhancement for immediate MDT in the air interface.
3. [1] Proposal 11: NPN enhancements for other SON related use cases can be further studied after the enhancement to RLF/HOF report and logged MDT are identified.
4. [2] Proposal 4: UE logs an out of coverage (OoC) indication either in RA report or CEF report or a new report.
5. [3] Proposal 6: RAN2 to discuss the potential issue about UE measurement resource wastes in SNPN.
6. [5] Proposal 5: Support logging of OOC instance in logged MDT for NPN in R18.
7. [5] Proposal 6: 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.
8. [7] Proposal 5: Suggests to discuss whether reporting the currently stored UE measurement reports to the network before the UE moves to another NPN or PN.
9. [8] Proposal 6: It is up to the network implementation to solve the issue of resource waste due to the non-real-time retrieval of SNPN-related reports
10. [9] Proposal 14: UE will record SON/MDT reports only if SNPN check holds. UE suspends logging if the registered NPN is not within the SNPN-identity store at UE.
11. [10] Proposal 3: UE access mode (e.g. SNPN access mode or with CAG-only indication) can be reported to network for OOC analysis

**Rapporteur's summary:** Some of these proposals are related to details of the proposals of the previous sections, and some of them brings up issues that are only touched by a single company. Rapporteur's proposal is to postpone the discussion on these proposals due to the lack of online time.

# 3 Conclusion

Proposals with a clear majority view

TBA

Proposals that require online discussions

TBA

Discussion on the proposals listed in section 2.5 are to be postponed.