3GPP TSG-RAN WG2 Meeting #109bis-e draft R2-2004047

Online, 20 – 30 March 2020

**Agenda item: 7.2.4**

**Source: Session Chair (Huawei)**

**Title: Summary of SON/ANR open issues**

**WID: NB\_IOTenh3-Core**

**Document for: Discussion and Decision**

# 1 Introduction

This document contains a summary of SON/ANR documents from agenda item 7.2.4 as referenced in Section 4 in order to facilitate decision making at RAN2#109bis-e.

# 2 Summary

## 2.1 Summary of open issues related to FFS from previous meetings

The following proposals are covered in this section

|  |  |  |
| --- | --- | --- |
| [4] | Huawei, HiSilicon | Proposal 1: Confirm the Working assumption that the ANR report is discarded after 96 hours.Proposal 2: ANR measurement report is discarded upon RAT change.Proposal 3: There is no need for a time indication of when the measurements were performed in the ANR measurement report.Proposal 4: The RLF report is discarded upon returning to idle if rlf-InfoAvailable has been reported.Proposal 5: RLF report is discarded upon RAT change.Proposal 6: The re-establishment cell ID is included in the RLF report. |
| [5] | ZTE | Proposal 1: Confirm the working assumption that the validity timer is fixed to 96 hours.Proposal 2: It’s suggested to include timeSpent information in ANR report to indicate the elapsed time since the generation of ANR record. And the value range of timeSpent is suggested to be INTEGER (0..5760) with unit of minutes. Proposal 3: The re-establishment cell id need to be included in the RLF report as an optional IE. Proposal 4: UE can discard RLF in the following cases: After 48 hours if not fetched. Power off or detach. Reporting rlf-InfoAvailable and returning to idle. |

### 2.1.1 Potential Easy agreements

Proposal 1 of [4] and [5] are the same.

[4] Proposal 1: Confirm the Working assumption that the ANR report is discarded after 96 hours.

[5] Proposal 1: Confirm the working assumption that the validity timer is fixed to 96 hours.

It is proposed to confirm, based on company input so far.

**Proposal S1-1: Confirm the Working assumption that the ANR report is discarded after 96 hours.**

**Company views**

**Summary: 6/6 companies support, propose to agree.**

|  |  |  |
| --- | --- | --- |
| **Company** | **Do you agree (yes/no)** | **Comments** |
|  | yes/no |  |
| Huawei, HiSilicon | yes |  |
| Nokia | yes |  |
| Ericsson | Yes |  |
| Lenovo | Yes |  |
| Qualcomm | ok |  |
| ZTE | Yes |  |

Proposal 2 of [4].

[4] Proposal 2: ANR measurement report is discarded upon RAT change.

It is proposed to confirm, based on company input so far.

**Proposal S1-2: ANR measurement report is discarded upon RAT change.**

**Company views**

**Summary: 5/6 companies support, propose to agree.**

|  |  |  |
| --- | --- | --- |
| **Company** | **Do you agree (yes/no)** | **Comments** |
|  | yes/no |  |
| Huawei, HiSilicon | yes |  |
| Nokia | Yes |  |
| Ericsson | Yes |  |
| Lenovo | Yes |  |
| Qualcomm | Yes |  |
| ZTE | Not necessary | Considering that ANR measurement can be stored for at most 96 hours, and UE may (re)select to another RAT and back again to NB-IoT during 96 hours, in such case the ANR measurement still can be reported. |

Proposal 6 of [4] and proposal 3 of [5] are the same:

Proposal 6: The re-establishment cell ID is included in the RLF report.

Proposal 3: The re-establishment cell id need to be included in the RLF report as an optional IE.

It is proposed to confirm, based on company input so far.

**Proposal S1-3: Re-establishment cell ID is included in the RLF report.**

**Company views**

**Summary: 6/6 companies support, propose to agree adding clarification that this is optional.**

**Proposal S1-3: Cell ID of the cell where re-establishment failed, if different to the current cell, is included in the RLF report when available..**

|  |  |  |
| --- | --- | --- |
| **Company** | **Do you agree (yes/no)** | **Comments** |
|  | yes/no |  |
| Huawei, HiSilicon | yes |  |
| Nokia | Yes |  |
| Ericsson | Yes |  |
| Lenovo | Yes |  |
| Qualcomm | Yes, but optional as ZTE explained. |  |
| ZTE | Yes | OPTIONAL as it is only useful in case that there has no/failed RRC connection re-establishment when RLF occurs. |

### 2.1.2 Needs further discussion

Proposal 3 of [4] and proposal 2 of [5] address the same issue but with opposite view.

[4] Proposal 3: There is no need for a time indication of when the measurements were performed in the ANR measurement report.

[5] Proposal 2: It’s suggested to include timeSpent information in ANR report to indicate the elapsed time since the generation of ANR record. And the value range of timeSpent is suggested to be INTEGER (0..5760) with unit of minutes.

Since there are opposing views, the following “positive” proposals are put forward for d**i**scussion.

**Proposal S1-4a: [FFS] Include timeSpent information in ANR report to indicate the elapsed time since the generation of ANR record**

**Company views**

**Summary: 3/6 companies support therefore currently cannot agree.**

|  |  |  |
| --- | --- | --- |
| **Company** | **Do you agree (yes/no)** | **Comments** |
|  | yes/no |  |
| Huawei, HiSilicon | no | From the network point of view, we are not quite sure how this indication would be used, as we expect the network deployment to be stable during the ANR measurements (e.g. during the next 96 hours following the configuration), so it should not really matter when the measurements are performed |
| Nokia | No | We don’t seen benefit of this information as the update of network configuration based on ANR measurements is upto network implementation. Without this information also network can identify the relevance of ANR report for the latest configuration. |
| Ericsson | Yes | Granularity in hours is ok [0-96] |
| Lenovo | Yes | This information could help network know the time point of ANR measurement and whether the ANR value is effective or outdated. |
| Qualcomm | - | Our earlier thought was some information about when the measurement was done would be helpful. But for progress ok to not have such indication. |
| ZTE | Yes | Since ANR measurement and report may span for a little long time and NW optimization may be performed at any time, the NW needs to know whether the ANR report is measured after the latest network optimization. In other word, ANR report is useful only when the ANR measurement is performed after the latest network optimization. |

**Proposal S1-4b: [FFS] timeSpent is defined as INTEGER (0..5760) with unit of minutes**

**Company views**

**Summary: Propose granularity of hours if S1-4a is agreed.**

|  |  |  |
| --- | --- | --- |
| **Company** | **Do you agree (yes/no)** | **Comments** |
|  | yes/no |  |
| Huawei, HiSilicon |  | see answer to S1-4aif RAN2 agree to have an indication we would prefer to name the parameter *timeStamp*  |
| Ericsson | No | Granularity in hours is ok [0-96] |
| Lenovo | No | Agree with Ericsson, granularity in hour is enough, but we are fine to the maximum value 96hours. |
| ZTE | - | Better to have finer granularity, but granularity in hours may be acceptable to us. |

Proposals 4 and 5 of [4] and proposal 5 of [5] propose various cases in which RLF report is discarded.

[4] Proposal 4: The RLF report is discarded upon returning to idle if rlf-InfoAvailable has been reported.

[4] Proposal 5: RLF report is discarded upon RAT change.

[5] Proposal 4: UE can discard RLF in the following cases:

 After 48 hours if not fetched.

 Power off or detach.

 Reporting rlf-InfoAvailable and returning to idle.

One of the options was already agreed in the previous meeting, RAN2#109-e:

🡺 RLF report is discarded after 48 hours if not fetched.

Since there multiple additional options, the following “positive” proposal is put forward for d**i**scussion.

**Proposal S1-5: [FFS] RLF report is discarded in the following cases:**

1. **Reporting rlf-InfoAvailable and returning to idle.**
2. **RAT change**
3. **Power off or detach.**
4. **(already agreed) after 48 hours if not fetched**

**Company views**

**Summary: 6/6 companies support (a) and (c). 5/6 companies support (b). Propose to agree.**

|  |  |  |
| --- | --- | --- |
| **Company** | **Do you agree (yes/no)** | **Comments** |
|  | (a) – yes/no(b) – yes/no(c) – yes/no |  |
| Huawei, Hisilicon | (a): yes(b): yes(c): yes | (a): same as agreed for ANR(b): because inter-RAT mobility is not supported in NB-IoT(c): same as legacy |
| Nokia | Yes for a to c |  |
| Ericsson | yes |  |
| Lenovo | Yes to all. |  |
| Qualcomm | Yes to all | Yes for a and c, b is not applicable. So, from spec point of view, b can be considered yes. |
| ZTE | a), c), d) | Even if b) is applicable, we think it’s not necessary to discard the RLF record in this case. |

## 2.2 Summary of new proposals

The following proposals are covered in this section

|  |  |  |
| --- | --- | --- |
| [1] | Ericsson, Nokia, Nokia Shanghai Bell, ZTE Corporation | Proposal 1 Send a LS to RAN4 to verify that the ANR measurements specified by RAN2 would work fine. |
| [2] | Ericsson  | Proposal 1 UE stores the CE level of the Last Serving Cell for RLFProposal 2 UE stores the CE level of serving cell when ANR measurement is being performed.Proposal 3 UE stores the change of CE level and corresponding RSRPs when ANR measurement is being performed.Proposal 4 UE stores the CE level of the target cell during ANR measurement when possible. |

### 2.2.1 Needs further discussion

The following proposal regarding sending an LS to RAN4 is made in [1]

Proposal 1 Send a LS to RAN4 to verify that the ANR measurements specified by RAN2 would work fine.

**Proposal S2-1: [FFS] Send a LS to RAN4 to verify that the ANR measurements specified by RAN2 would work fine.**

**Company views**

**Summary: 3/6 companies support therefore currently cannot agree.**

|  |  |  |
| --- | --- | --- |
| **Company** | **Do you agree (yes/no)** | **Comments** |
|  | yes/no |  |
| Huawei, HiSilicon | no | We do not see the need for this. This is the same approach as MDT in LTE. Note that the whole point of using ell reselection measurements was to avoid impact on RAN4  |
| Nokia | Yes | The specific aspects of cell reselection measurements applicable for ANR measurements and time requirements may require RAN4 analysis |
| Ericsson | Yes | Agree with Nokia. From RAN2, we have assumed that cell reselection would work fine. There are several (delay) timers and also eDRX/DRX timers are involved. RAN4 can do a sanity check, we can inform the RAN2 agreements to RAN4.  |
| Lenovo | No | We don’t see the significant issue we needs to notice RAN4. |
| Qualcomm | No | Agree with Huawei’s comment |
| Ericsson | Yes | We should not compare the LTE MDT with NB-IoT ANR. The purpose with LTE MDT is not to find strongest cell using cell reselection; but simply to record RSRP/RSRQ; however our main purpose is to determine strongest cell. |
| ZTE | Yes | Agree with Nokia and Ericsson. |

The following proposals related to the storing of CE level information are made in [2]

Proposal 1 UE stores the CE level of the Last Serving Cell for RLF

Proposal 2 UE stores the CE level of serving cell when ANR measurement is being performed.

Proposal 3 UE stores the change of CE level and corresponding RSRPs when ANR measurement is being performed.

Proposal 4 UE stores the CE level of the target cell during ANR measurement when possible.

**Proposal S2-1: [FFS] UE stores the following CE level information :**

1. **CE level of the Last Serving Cell for RLF.**
2. **CE level of serving cell when ANR measurement is being performed**
3. **Change of CE level and corresponding RSRPs when ANR measurement is being performed**
4. **CE level of the target cell during ANR measurement when possible**

**Company views**

**Summary: the only proposal which seems to have a potential to be agreed is the new/compromise:**

**Proposal S2-2: UE stores the serving cell measurement at the time where the neighbour cell measurement is taken (in ANR-MeasResult-NB)**

|  |  |  |
| --- | --- | --- |
| **Company** | **Do you agree (yes/no)** | **Comments** |
|  | (a) – yes/no(b) – yes/no© – yes/no(d) – yes/no |  |
| Huawei, HiSilicon | (a) –no(b) –©(c) –no(d) –no | A general comment is that the concept of CEL only exists in MAC in the context of the NPRACH resource selection so it not applicable here. In any case, RSRP measurement provide a more accurate informat©.(c): do not really understand what is proposed. |
| Nokia | No | It is not clear whether proposal is to include the CEL in the reports. If it is to be reported the benefit is not clear. |
| Ericsson | Yes | Agree with Huawei that it should be NPRACH level. NPRACH level based upon NRSRP threshold may change. It will not be constant. The operator may not do the post processing immediately. In such cases, the reported NPRACH Level along with NRSRP is beneficial.The objective of c) is to identify if the UE was moving between different NRSP thresholds in such case multiple source NRSRP result can be stored rather than just one.  |
| Lenovo | Yes to (a) | The CE level reporting is beneficial for network SON.For (a), it could make network understand in which CE range of last serving cell the UE RLF happened.For (b)-(d), it is complex and maybe corner case. If CE level has to be reported, we prefer the CE level of serving cell and target cell is reported once the ANR measurement is finished |
| Ericsson |  | Just to answer to Lenovo; UE may store only the last RSRP before moving to new RSRP threshold area. As part of ANR anyway UE is computing RSRP so it should not be adding complexity. From NW perspective, it is important to understand that strong cell is detected when UE has been moving around the serving cell. Since ANR measurement can take long duration, it would be good to get additional samples of RSRP measurement; i.e based upon CE level change. |
| Qualcomm | No extra info needed | For RLF report, RAN2 already agreed initial CEL/NRSRP. Unclear whether proposal a is for RLF or for ANR. But for ANR, we are not sure why it is helpful. |
| Ericsson |  | One simple approach that hopefully companies can support is that: The serving cell measurement is taken at the time just before the ANR measurement is started and then serving cell measurement at the time where the neighbor cell measurement is taken. So basically, below addition which Lenovo also mentioned.ANR-MeasReport-NB-r16 ::=   SEQUENCE {    servCellIdentity-r16                CellGlobalIdEUTRA           OPTIONAL,    measResultServCell-r16             SEQUENCE {        nrsrpResult-r16                    NRSRP-Range-NB-r14,        nrsrqResult-r16                    NRSRQ-Range-NB-r14    },    measResultList-r16                 SEQUENCE (SIZE (1.. maxFreqANR-NB-r16)) OF ANR-MeasResult-NB-r16,    ...}ANR-MeasResult-NB-r16 ::=   SEQUENCE {    carrierFreq-r16                    CarrierFreq-NB-r13,    physCellId-r16                     PhysCellId                  OPTIONAL,    measResultServCell-r16             SEQUENCE {        nrsrpResult-r16                    NRSRP-Range-NB-r14,        nrsrqResult-r16                    NRSRQ-Range-NB-r14    },    measResult-r16                     SEQUENCE {        nrsrpResult-r16                    NRSRP-Range-NB-r14,        nrsrqResult-r16                    NRSRQ-Range-NB-r14    }   OPTIONAL,    cgi-Info-r16                       SEQUENCE {        cellGlobalId-r16                    CellGlobalIdEUTRA,        trackingAreaCode-r16                TrackingAreaCode,        plmn-IdentityList-r16              PLMN-IdentityList2       OPTIONAL    }   OPTIONAL} |
| ZTE | Yes to (a) | We have sympathy with Ericsson and Lenovo’s comments and think it’s beneficial to additionally include CE level info for RLF report.We are also fine with the above change given by Ericsson. We assume it may come for free of recording the serving cell measurement at the time when recording neighboring cell measurement.For (d), we think it may be infeasible as UE may not know the RSRP threshold of the target cell.For (b) and (c), we need more thinking on whether it’s needed based on the above change. |
| Huawei 2 |  | We can agree on the alternative proposed by E///. |

* [CB]: FFS- In addition to the serving cell measurement stored when the configuration is received, UE stores the latest serving cell measurement when the neighbour cell measurement is stored (in ANR-MeasResult-NB)

|  |  |  |
| --- | --- | --- |
| **Company** | **Do you agree (yes/no)** | **Comments** |
| Ericsson | Yes | As discussed online, the ANR measurement may take long duration, thus it is important to understand if there were any variations in RSRP measurement (e.g: whether UE was moving; if the strong cell is detected while the UE is fairly stationary or even while UE is moving and for operator to co-relate the results to different NPRACH Threshold levels)The serving cell measurement is taken at the time just before the ANR measurement is started and then serving cell measurement at the time where the neighbor cell measurement is taken. So basically, below addition which Lenovo also mentioned.ANR-MeasReport-NB-r16 ::=   SEQUENCE {    servCellIdentity-r16                CellGlobalIdEUTRA           OPTIONAL,    measResultServCell-r16             SEQUENCE {        nrsrpResult-r16                    NRSRP-Range-NB-r14,        nrsrqResult-r16                    NRSRQ-Range-NB-r14    },    measResultList-r16                 SEQUENCE (SIZE (1.. maxFreqANR-NB-r16)) OF ANR-MeasResult-NB-r16,    ...}ANR-MeasResult-NB-r16 ::=   SEQUENCE {    carrierFreq-r16                    CarrierFreq-NB-r13,    physCellId-r16                     PhysCellId                  OPTIONAL,    measResultServCell-r16             SEQUENCE {        nrsrpResult-r16                    NRSRP-Range-NB-r14,        nrsrqResult-r16                    NRSRQ-Range-NB-r14    },    measResult-r16                     SEQUENCE {        nrsrpResult-r16                    NRSRP-Range-NB-r14,        nrsrqResult-r16                    NRSRQ-Range-NB-r14    }   OPTIONAL,    cgi-Info-r16                       SEQUENCE {        cellGlobalId-r16                    CellGlobalIdEUTRA,        trackingAreaCode-r16                TrackingAreaCode,        plmn-IdentityList-r16              PLMN-IdentityList2       OPTIONAL    }   OPTIONAL} |

# 3 Conclusions

**Easy agreements:**

**Proposal S1-1: Confirm the Working assumption that the ANR report is discarded after 96 hours.**

**Proposal S1-2: ANR measurement report is discarded upon RAT change.**

**Proposal S1-3: Cell ID of the cell where e-establishment failed, if different to the current cell, is included in the RLF report when available..**

**Needs further discussion:**

**Proposal S2-2: UE stores the serving cell measurement at the time where the neighbour cell measurement is taken (in ANR-MeasResult-NB)**

**No consensus:**

# 4 List of referenced documents

1. [R2-2003131](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_109bis-e/Docs/R2-2003131.zip) To Verify ANR Measurements Ericsson, Nokia, Nokia Shanghai Bell, ZTE Corporation discussion Rel-16
2. [R2-2003133](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_109bis-e/Docs/R2-2003133.zip) Logging of CE Level for RLF and ANR measurements Ericsson discussion Rel-16
3. [R2-2003139](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_109bis-e/Docs/R2-2003139.zip) Draft LS to RAN4 on ANR Measurements Ericsson [To be RAN2] LS out Rel-16 NB\_IOTenh3-Core To:RAN4
4. [R2-2003247](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_109bis-e/Docs/R2-2003247.zip) SON remaining issues Huawei, HiSilicon discussion Rel-16 NB\_IOTenh3-Core
5. [R2-2003291](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_109bis-e/Docs/R2-2003291.zip) Remaining FFSs for SON in NB-IoT ZTE Corporation, Sanechips discussion Rel-16 NB\_IOTenh3-Core