**3GPP TSG-RAN WG2 Meeting #116 electronic R2-21xxxxx**

**Online, 1 – 12 Nov 2021**

**Agenda Item: 8.13 SON/MDT**

**Source: Huawei**

**Title: Report of [AT116e][820][SON/MDT] Information required by SNSCG (Huawei)**

**Document for: Discussion and decision**

# Introduction

This document is to kick off the following email discussion:

* **[AT116e][820][SON/MDT] Information required by SNSCG (Huawei)**

Focus on summary proposal 1, 2 and 3 in R2-2110637

(1) For summary proposal 1, progress on the conditions which will trigger to log RA information.

(2) progress on summary proposal 3.

(3) just final check and confirm to agree proposal 2.

Intended outcome: Agreements

Deadline: 05:00 UTC, Friday November 5th

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# Discussion

Based on the RAN3 LS [2], the parameters are listed as below:

RAN3 discussed the solution for the optimization of PScell change failure for MRO in case of MR-DC. RAN3 agreed it is beneficial for the NG-RAN node to receive the list of information as shown below for the purpose of PSCell failure analysis:

1) CGI of the Source PSCell: the source PSCell of the last SN change. The source PSCell could be E-UTRA cell or NR cell.

2) CGI of the Failed PSCell: the PSCell in which SCG failure is detected or the target PSCell of the failed PScell change. The Failed PSCell could be E-UTRA cell or NR cell.

3) timeSCGFailure: the time elapsed since the last PSCell change initialization until SCG failure.

4) connectionFailureType: radio link failure or SN change failure.

5) random-access related information set by the PSCell

2.1 Discussion on summary proposal 1

In summary proposal 1, some conditions of including RA info in the existing SCG failure message are provided and they are FFS.

Summary proposal 1: Put RA information (the 5th parameter) in the existing SCG failure message when some conditions are met. FFS for conditions e.g. the UE would not include RA information to the SCG failure message in case of too late handover failure, and the UE only needs to include RA information in case of RA problem/BFR resulted RLF and HOF.

During email discussion [Post115-e][897], some companies pointed out that the condition “too late handover failure” is unclear, so it is suggested to focus on RA problem and BRF problem, i.e. when failureType=randomAccessProblem, or failureType=beamFailureRecoveryFailure-r16 (relevant ASN.1 text is shown as below).

FailureReportSCG ::= SEQUENCE {

failureType ENUMERATED {

t310-Expiry, randomAccessProblem,

rlc-MaxNumRetx,

synchReconfigFailureSCG, scg-ReconfigFailure,

srb3-IntegrityFailure, other-r16, spare1},

measResultFreqList MeasResultFreqList OPTIONAL,

measResultSCG-Failure OCTET STRING (CONTAINING MeasResultSCG-Failure) OPTIONAL,

...,

[[

locationInfo-r16 LocationInfo-r16 OPTIONAL,

failureType-v1610 ENUMERATED {scg-lbtFailure-r16, beamFailureRecoveryFailure-r16,

t312-Expiry-r16, bh-RLF-r16, spare4, spare3, spare2, spare1} OPTIONAL

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}

**Q1: Do companies agree that the UE needs to include RA information in case that failureType is set to randomAccessProblem?**

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| --- | --- | --- |
| Company | Agree?  (Yes or No) | Comments |
| Huawei, HiSilicon | Yes |  |
| Ericsson | Yes |  |
| Qualcomm | Yes |  |
| vivo | Yes |  |
| ZTE | Yes |  |
| CATT | Yes |  |
| Sharp | Yes |  |
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Summary: TBD

**Q2: Do companies agree that the UE needs to include RA information in case that failureType is set to beamFailureRecoveryFailure-r16?**

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| Company | Agree?  (Yes or No) | Comments |
| Huawei, HiSilicon | Yes |  |
| Ericsson | Yes |  |
| Qualcomm | Yes |  |
| vivo | Yes |  |
| ZTE | Yes |  |
| CATT | Yes |  |
| Sharp | Yes |  |
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Summary: TBD

If you think other conditions can be also considered, please provide your comments in the the table below.

**Q3: Do you have comments on other other conditions?**

|  |  |
| --- | --- |
| Company | Comments |
| Ericsson | The UE should also include RA related information when the *failureType* is set to *synchReconfigFailureSCG* as this is equivalent to T304 expiry which happens during the RA procedure towards a target cell of reconfiguration with sync. |
| ZTE | Share the same view as Ericsson. |
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Summary: TBD

2.2 Discussion on summary proposal 2

One target is that (3) just final check and confirm to agree proposal 2.

Summary proposal 2: RA-InformationCommon-r16 is used as a baseline to indicate random-access related information set by the PSCell.

**Q4: Do companies agree with summary proposal 2?**

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| --- | --- | --- |
| Company | Agree?  (Yes or No) | Comments |
| Huawei, HiSilicon | Yes |  |
| Ericsson | Yes |  |
| Qualcomm | Yes |  |
| vivo | Yes |  |
| ZTE | Yes |  |
| CATT | Yes |  |
| Sharp | Yes |  |
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2.3 Discussion on summary proposal 3

During the email discussion [Post115-e][897], whether the first 4 parameters in the RAN3 LS [2] can be implicitly indicated by existing IEs is an open issue, and then summary proposal 3 is made.

Summary proposal 3: For the 1st, 2nd, 3rd and 4th parameter, it is proposed to continue discussing whether they can be implicitly indicated by existing Ies in SCG failure information or new parameters are needed (based on observations for question 2a).

In the email report [1], some observations were provided by some companies, and it is proposed to use the observations as a baseline for collecting companies’ opinions.

**Observations:**

1. If the *failureType* in *SCGFailureInformation* message is set to *synchReconfigFailureSCG* then the *connectionFailureType* is *HOF*, otherwise *connectionFailureType* is *RLF*. Therefore *connectionFailureType* is not required in *SCGFailureInformation*.
2. As the *SCGFailureInformation* message is sent immediately to the MN, the value of *timeSCGFailure* is expected to be 0 most of the times if not all of the times. Therefore, *timeSCGFailure* is also not required in *SCGFailureInformation* message.
3. If the *failureType* in *SCGFailureInformation* message is set to *synchReconfigFailureSCG* then this is a HOF and as the *SCGFailureInformation* is sent to the MN immediately and as the UE context is still present in the network side (both at MN and SN), the network should be able to figure out that the failed PSCell is the target cell of the PSCell change procedure and also the previous PSCell that sent the PSCell change command to the UE. Thus including *failedPSCell* and *previousPSCell* is not required in the *SCGFailureInformation* message when *failureType* in *SCGFailureInformation* message is set to *synchReconfigFailureSCG*.
4. If the *failureType* in *SCGFailureInformation* message is set to a value other than *synchReconfigFailureSCG* then this is a RLF on SCG and as the *SCGFailureInformation* is sent to the MN immediately and as the UE context is still present in the network side (both at MN and SN), the network should be able to figure out that the failed PSCell is the current PSCell. Thus including *failedPSCell* and *previousPSCell* is not required in the *SCGFailureInformation* message when *failureType* in *SCGFailureInformation* message is set to a value other than *synchReconfigFailureSCG*.
5. we think one issue to purely rely on the existing failureType is that UE will miss categorized an reconfigurationWithSyncFailure(will be classified as HOF) as RandomAccessProblem(will be classified as RLF), because when deciding SN failure cause, UE will not check T304 status. We can reuse failureType, but with a small enhancement that one indication can be included to indicate whether T304 is running.

**Q5: Do companies agree with the above observation 1), 2), 3), 4) and 5)?**

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| --- | --- | --- |
| Company | Agree?  (Yes or No) | Comments |
| Huawei, HiSilicon | Yes for 1) | Firslty, we think the failureType IE can be used to indicate HOF/RLF, and it is up to network implementation. So parameter 4) can be indicated via existing IEs.  for 2), it is “the time elapsed since the last PSCell change initialization until SCG failure.” in the RAN3 LS, so the actual value may be small or large. We are not sure whether it is expected to be 0ms most of the times.  For 3) and 4), for MN initiated SN change, we tend to agree with both observations. However, in case of intra-SN change without MN involvement, the parameter 1) and 2) are still userful. Here is an example,  Step 1: UE performs SN change from SN1 to SN2  Step 2: UE performs intra-SN change from SN2-cell1 to SN2-cell2 (without MN involvement)  Step 3: during intra-SN change, the UE suffers a failure  Without parameter 1) and 2), MN may wrongly consider that the Pscell change failure is about SN change from SN1 to SN2, so both parameters can help MN understand that the failure is about a intra-SN change.  For 5), no strong opinion. |
| Ericsson | Agree with 1) ,2), 3) and 4).  See comments for 5) | **Regarding 1), 2), 3) and 4):**  Further detailed explanation is provided in section 2.4 in R2-2110854.  Regarding the comment from Huawei on 3) and 4), the scenario mentioned is that the MN performs the SN/PSCell failure classification at the reception of SCGFailureInformation. We believe this need not be the case all the time as the SN still has the UE context and thus upon receiving the SCG failure related information, SN can determine the correct failedPSCell and the previousPSCell.  As all the information required to perform the classification is available on the network side (SN who has the latest PSCell related context), we believe UE need not include any failedPScell or the previousPSCell information.  **Regarding 5)**  We believe this is a network configuration issue wherein the T304 is still running but maximum number of RA attempts has been reached. T304 was introduced so that the UE can quickly declare HOF and does not keep on trying to perform RA procedure for all the RA attempts which might take longer time. Network can estimate how long the ‘max RA attempt’ might take as this maximum number is also configurable and thus configuring T304 to a value larger than that would be a poor network configuration.  Having said that, we can compromise on the addition of this one bit flag in *SCGFailureInformation* to indicate whether T304 is running or not when the failureType is set to RandomAccessProblem |
| Qualcomm | Agree with 1), 3) 4)  No for 2) 5) | 1. Agree with 1) that if faiureType is *synchReconfigFailureSCG* then *connectionFailureType* is HOF (i.e. PSCell Change or addition failure) 2. In post RAN2#115-emeeting email discussion [897], we defined *timeSCGFailure,* as*:*   timeSCGFailure: the time elapsed since the last PSCell change initialization until SCG failure.  In our understanding, 2) might not always be true, for example, in the case of too early/wrong cell SCG Failure (i.e SCG failure after successful SN change or addition). The timer may be required.     1. We agree with 3) that if *failureType* in *SCGFailureInformation* message is set to *synchReconfigFailureSCG,* then both previous PSCell and failed PSCell information will be available to MN and/or Source SN. Therefore, there is no need of reporting them in SCGFailureInformation. 2. Considering PSCell MHI, we agree that the previous PSCell ID (S-SN) information should be known at least at the T-SN. 3. As described in the TS 38.331 section 5.7.3.3, what stated in 5) is wrong. UE will not classify reconfigurationWithSyncFailure as RandomAccessProblem (see highlighted part). First UE checks for failureType as reconfigurationWithSyncFailure, i.e., if SN addition or change fails because of unsuccessful RACH, UE will classify this as reconfigurationWithSyncFailure not RandomAccessProblem.  5.7.3.3 Failure type determination for (NG)EN-DC The UE shall set the SCG failure type as follows:  1> if the UE initiates transmission of the *SCGFailureInformationNR* message due to T310 expiry:  2> set the *failureType* as t310-Expiry;  1> else if the UE initiates transmission of the *SCGFailureInformationNR* message due to T312 expiry:  2> set the *failureType* as any valueand set the *failureType-v1610* as t312-Expiry;  1> else if the UE initiates transmission of the *SCGFailureInformationNR* message to provide reconfiguration with sync failure information for an SCG:  2> set the *failureType* as *synchReconfigFailureSCG*;  1> else if the UE initiates transmission of the *SCGFailureInformationNR* message to provide random access problem indication from SCG MAC:  2> if the random access procedure was initiated for beam failure recovery:  3> set the *failureType* as *randomAccessProblem* and set the *failureType-v1610* as *beamFailureRecoveryFailure*;  2> else:  3> set the *failureType* as *randomAccessProblem*;  /\*omitted |
| vivo | Agree with 1)3)4) | For 2): According to the definition of *timeSCGFailure*, the value of the timer might not always be expected to be 0, so we think this timer can be included.  For 5): Agree with QC’s analysis. |
| ZTE | Agree with 5 | For 1) please refer to comments in (5)  For 2) we share similar understanding as Qualcomm  For 3) and 4) Based on the CG-Config specified in current specs, MN can only know about the frequency range of PSCell, not physical cell id let along the CGI info, therefore even if UE context is available, MN still cannot know the CGI (or frequency+physical cell id) of failed PSCell. Maybe SN can know, however according to RAN3’s discussion this information is also useful for MN, e.g, for SN addition. Therefore it is preferred to explicitly included in SCG failure information.  In addition for target cell id in 3), considering that in the future we might support recording CPAC information in SCG failure information, in which case since the selection of PSCell is taken by UE, thus NW is not aware of the candidate PSCell selected, thus the CGI ( or frequency range+ physical cell id) of target PSCell ID is needed for future proofing.  For (5) we believe the enhancement is needed and necessary. The main issue is actually the inconsistent failureType checking behavior between MN and SN. For RLF/HOF detected in MN, UE will check T304 before declare an RLF is triggered due to RA problem which means companies consider this configuration is valid. Since RAN3 will use this failureType for failure cause rooting, it is important that the correct connection failure type is provided. And we appreciate Ericsson’ s understanding and compromise.  Thanks for Qualcomm to raise the question, but we’d like to clarify that according to current specs, UE checks the failureType in SCG based on following description: 5.3.10.3 Detection of radio link failure The UE shall:  1> if any DAPS bearer is configured and T304 is running:  2> upon T310 expiry in source SpCell; or  2> upon random access problem indication from source MCG MAC; or  2> upon indication from source MCG RLC that the maximum number of retransmissions has been reached; or  2> upon consistent uplink LBT failure indication from source MCG MAC:  3> consider radio link failure to be detected for the source MCG i.e. source RLF;  3> suspend the transmission and reception of all DRBs in the source MCG;  3> reset MAC for the source MCG;  3> release the source connection.  1> else:  2> during a DAPS handover: the following only applies for the target PCell;  2> upon T310 expiry in PCell; or  2> upon T312 expiry in PCell; or  2> upon random access problem indication from MCG MAC while neither T300, T301, T304, T311 nor T319 are running; or  2> upon indication from MCG RLC that the maximum number of retransmissions has been reached; or  2> if connected as an IAB-node, upon BH RLF indication received on BAP entity from the MCG; or  2> upon consistent uplink LBT failure indication from MCG MAC while T304 is not running:  3> if the indication is from MCG RLC and CA duplication is configured and activated for MCG, and for the corresponding logical channel *allowedServingCells* only includes SCell(s):  4> initiate the failure information procedure as specified in 5.7.5 to report RLC failure.  3> else:  4> consider radio link failure to be detected for the MCG, i.e. MCG RLF;  4> discard any segments of segmented RRC messages stored according to 5.7.6.3;  NOTE: Void.  4> if AS security has not been activated:  5> perform the actions upon going to RRC\_IDLE as specified in 5.3.11, with release cause 'other';-  4> else if AS security has been activated but SRB2 and at least one DRB or, for IAB, SRB2, have not been setup:  5> store the radio link failure information in the *VarRLF-Report* as described in subclause 5.3.10.5;  5> perform the actions upon going to RRC\_IDLE as specified in 5.3.11, with release cause 'RRC connection failure';  4> else:  5> store the radio link failure information in the *VarRLF-Report* as described in subclause 5.3.10.5;  5> if T316 is configured; and  5> if SCG transmission is not suspended; and  5> if neither PSCell change nor PSCell addition is ongoing (i.e. timer T304 for the NR PSCell is not running in case of NR-DC or timer T307 of the E-UTRA PSCell is not running as specified in TS 36.331 [10], clause 5.3.10.10, in NE-DC):  6> initiate the MCG failure information procedure as specified in 5.7.3b to report MCG radio link failure.  5> else:  6> initiate the connection re-establishment procedure as specified in 5.3.7.  The UE shall:  1> upon T310 expiry in PSCell; or  1> upon T312 expiry in PSCell; or  1> upon random access problem indication from SCG MAC; or  1> upon indication from SCG RLC that the maximum number of retransmissions has been reached; or  1> if connected as an IAB-node, upon BH RLF indication received on BAP entity from the SCG; or  1> upon consistent uplink LBT failure indication from SCG MAC:  2> if the indication is from SCG RLC and CA duplication is configured and activated for SCG, and for the corresponding logical channel *allowedServingCells* only includes SCell(s):  3> initiate the failure information procedure as specified in 5.7.5 to report RLC failure.  2> else:  3> consider radio link failure to be detected for the SCG, i.e. SCG RLF;  3> if MCG transmission is not suspended:  4> initiate the SCG failure information procedure as specified in 5.7.3 to report SCG radio link failure.  3> else:  4> if the UE is in NR-DC:  5> initiate the connection re-establishment procedure as specified in 5.3.7;  4> else (the UE is in (NG)EN-DC):  5> initiate the connection re-establishment procedure as specified in TS 36.331 [10], clause 5.3.7;  Then based on above description, if random access problem indication received from SCG MAC before expiry of T304, UE will consider the SCG failure information is triggered due to RandomAccessProblem caused RLF instead of reconfigurationWithSyncFailure, since T304 has not yet expired. And then UE goes to subclause 5.3.7 for detailed content setting. One way to handle this is to revise UE’s behavior, to align with MN RLF/HOF detection behavior, but it will impact R16 UE implementation which might not acceptable for some companies, thus as a compromise, we suggest to add an indication to indicate T304 is running when RondomAccessProblem is used to avoid misunderstanding. But if in any case, companies prefer to align SN/MN behavior, than it would be perfect for us. ;-) |
| CATT | Yes for 1) | For 1), we agree that for *synchReconfigFailureSCG* the *connectionFailureType* is *HOF*, otherwise *connectionFailureType* is *RLF*;  For 2), for SCG failure similar as MN “too late HO”, the time elapse is almost 0, but for SCG failure similar as MN “too early HO” or ”HO to wrong cell”, the timer corresponds to the last successful PSCell change until SCG failure, which is not 0 at all;  For 3) and 4), the MN may not know the PSCell change related information without MN involved, therefore the *failedPSCell* and *previousPSCell* are also needed;  For 5), as QC commented, the UE will not set the failureType to RandomAccessProblem if the UE initiates the message to provide reconfiguration with sync failure information for an SCG. |
| Sharp | Agree with 1)3)4)5) | For 2) *timeSCGFailure*, we share Qualcomm’s comment.  For 5), we agree with the intention. Just as ZTE’s explanation, in case of a PSCell reconfiguration with sync, SCG RLF may be declared by UE before T304 expiry, and this failure will be recorded as “*randomAccessProblem*” rather than *synchReconfigFailureSCG*. We assume in other cases, the network may know whether the UE is performing reconfiguration with sync or not when receiving the *SCGFailureInformation* message, but for CPC, the network may not know about this.  And we are open for how to fix it, e.g. align with MN behaviour or add the proposed indication. |
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Summary: TBD

If observation 1), 2), 3) and 4) are agreeable, new parameters are not needed and it means the first 4 parameters in the LS [2] can be indicated by existing IEs. Otherwise, new parameters may be needed.

**Q6: What parameters do companies want to introduce? And please provide some explanations.**

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| --- | --- | --- |
| Company | New parameters? | Comments |
| Huawei, HiSilicon | 2), 3), 4) | As we commented for Q5, 2), 3) and 4) can not be indicated by exsiting Ies in some cases, so it will be good to introduce them. |
| Ericsson | None | At best, we are fine with 5) as this is a 1 bit flag. |
| vivo | 2) |  |
| ZTE | 2),3),4), 5) |  |
| CATT | 1), 2), 3), 5) | 1), 2), 3), 5) in the RAN3 LS should be reported, and the 4) connectionFailureType could reuse current failureType as we commented in Q5. |
| Sharp | 2),5) |  |
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Summary: TBD

# Conclusions

[To be added]

# Reference

[1] R2-2110637 [Post115-e][897][SONMDT] Modeling aspects related to information required by SNSCG (Huawei) Huawei

[2] R2-2102639/R3-211332 LS on information needed for MRO in SCG Failure Report