**3GPP TSG RAN WG2#120 R2-22xxxxx**

**Toulouse, France, 14th - 19th November , 2022**

**Source: ZTE Corporation, Sanechips**

**Title: Summary on 8.13.8 others**

**Agenda item:** **8.13.8**

**Document for:** **Discussion and Decision**

# Introduction

**[Pre120][803][R17 SON/MDT] Finding a way from others (ZTE)**

* Summarize the papers in 8.13.8.
* Finding out something we can discuss without RAN3 involved and try to make some agreeable proposals on them.

Comments are welcome no later than Tuesday 15 Nov. 2022, 13:00 a.m. Toulouse local time

This document provides the summary of the contributions submitted to agenda item 8.13.8 others, identifying issues can be discussed in RAN2 without dependency in RAN3 progress.

In subclause 2, companies’ proposals are categorized into different topics, where for each topic an initial analysis and proposals are made. Based on level of support proposals are classified into different categories in conclusion part, and it is expected that all proposals shall be discussed and confirmed online.

# Discussion

## Fast MCG recovery

Relevant proposals:

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| **TDoc** | **Company name** | **Proposals** |
| [3] R2-2212036  | Lenovo | Proposal 1: MRO for fast MCG link recovery in NR-NR DC should be prioritized in R18. |
| [4] R2-2212094  | Ericsson | Proposal 5 UE does not delete the RLF report upon successful MCG recovery.Proposal 6 Upon successful MCG recovery, the UE logs the time spent from initiation of MCG recovery to a successful MCG recovery (time of stopping T316) in the RLF report.Proposal 7 Upon MCG recovery failure, the UE logs the followings in the RLF report:• the time of fast MCG recovery failure (T316 timer value)• SCG failure cause• SCG deactivated/suspended indication |
| [6] R2-2212107 | NTT DOCOMO, INC. | Proposal1: Introduce a new rlf-cause of “reconfigureWithSyncFailurSCG and MCG transmission is suspended ”in RLF report.Proposal2: Introduce a new rlf-cause of MCGRecoveryFailure or T316 expiry in in RLF report.Proposal3: Introduce a new rlf-cause of MCGRecoveryFailureWthSCGDeactivated in in RLF report.Proposal4: In case RLF is triggered by SCG and MCG transmission is suspended, UE store the SCGFailureInformation and measResultMCG in VarRLF-Report.Proposal5: In case RLF is triggered by MCG and SCG transmission is suspended, UE store the MCGFailureInformation and measResultSCG in VarRLF-Report. |
| [7] R2-2212224 | Huawei, HiSilicon | Proposal 9: Since UE declares MCG RLF, UE logs MCG RLF report, it makes sense for the MCG RLF report to further log fast MCG recovery failure.Proposal 10: Send LS to RAN2 to consider information reported from UE for MRO for MCG fast recovery:- The root cause of the fast MCG recovery failure, e.g., PSCell addition/change, T316 expiry, SCG RLF, SCG deactivation- The SCG RLF failure type - T316 operation time |
| [8] R2-2212287 | ZTE Corporation, Sanechips | Proposal 1: Below scenarios are considered for R18 SON-MDT enhancement for fast MCG recovery:* T316 expiry
* Both MCG and SCG fails during fast MCG recovery

Proposal 2: To add fast MCG recovery failure as connectionFailureType in RLF report when radio link is detected in MN and fast MCG recovery fails.Proposal 3: To include information to indicate the fast MCG recovery cause (e.g. T316 expiry or both SCG/MCG fails) in RLF-report.Proposal 4: It is proposed to include location information in MCG failure information. |
| [9] R2-2212298 | Samsung R&D Institute India | Proposal 1: UE indicates Fast MCG link recovery failure in the RLF report.Proposal 2: UE includes an indication of T316 expiry in the RLF report.Proposal 3: UE includes an indication of failure of fast MCG recovery due to SCG error in RLF Report.Proposal 4: UE includes an indication when fast MCG recovery was not initiated when T316 is configured in RLF Report.Proposal 5: A single enumeration for e.g. Mcgfailureinfo-status can handle all the indications from P1-P4.Proposal 6: RAN2 to discuss if any additional information is needed for SON/MDT in some scenarios where fast MCG recovery is successful. |
| [10] R2-2212453 | Nokia, Nokia Shanghai Bell | Proposal 1: RAN2 to investigate T316 optimization and relevant scenarios.Proposal 2: The UE logs the elapsed T316 timer value at the moment it received the HO command from the MN in the SHR. Proposal 3: The triggering condition for logging the SHR in the case of the fast MCG recovery can be the start of T316.Proposal 4: The SHR can include an indication that HO was part of the fast MCG recovery. Proposal 5: In case the MN instructed the UE to release the connection, the UE does not delete the RLF report and adds the elapsed T316 timer value at the moment it received the release command from the MN.Proposal 6: An additional cause value can be added to the RLF report, e.g. RRC release command. |
| [12] R2-2212672 | Qualcomm | Proposal 8: Upon the detection of fast MCG recovery failure, enhance the RLF report to include the following additional information,* Upon t316 expiry, include an indicator to indicate fast MCG recovery failure
* Introduce an indicator to indicate if SCG Failure is detected during the MCG recovery procedure
* Introduce an Indicator to indicate if SCG was deactivated when MCG failure is detected at the UE
* Include the cause of SCG failure, if SCG failure detected before the t316 expiry
* Include configured SCG RRM measurements in the RLF report, if SCG RLF is detected during the fast MCG recovery procedure
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| [13] R2-2212713 | CMCC | Proposal 1: Optimisation for failure of fast MCG recovery and near failure fast MCG recovery should be considered.Proposal 2: UE reports following information to enable efficient optimisation for fast MCG link recovery:* SCG fails or is deactivated when the UE attempts MCG recovery (i.e. a SCG failure/deactivation while T316 is running after MCG failure)
* T316 expires

Proposal 3: RAN2 is kindly asked to discuss following assistance information reported by the UE to enable efficient optimisation for fast MCG link recovery:* Time between MCG failure and SCG failure
* Time between transmitting MCGFailureInformation and receiving RRC reconfiguration message, or the ratio between the value of the elapsed time of the timer T316 and the configured value of the timer T316

Proposal 4: For near failure fast MCG link recovery, one T316 related triggering threshold is configured, and UE only generates the report when the threshold is met. |
| [16] R2-2212730 | Sharp | Proposal 1: both scenarios are considered for SON enhancement for fast MCG recovery, i.e.fast MCG recovery is successful and fast MCG recovery failure.Proposal 2: UE does not clear the stored RLF-report when receiving an RRCReeconfiguration or RRCRelease message in response to MCGFailureInformation message in fast MCG recovery case.Proposal 3: UE reports fast MCG recovery related information to the network, which includes * whether the fast MCG recovery is successful or not,
* the reason that causes the failed fast MCG recovery,
* the time information of T316 elapsed value.
 |
| [18] R2-2212850 | OPPO | Proposal 1: RAN2 to specify the fast MCG recovery report to help the network perform optimization of the T316.Proposal 2: RAN2 to at least include following information in the fast MCG recovery report for optimization of the T316:* Location information up to the MCG failure occurrence
* Failed PCell ID
* Indication of the fast MCG recovery failure occurrence
* The measurement result of the SCG
 |

### On scenarios

One company (Lenovo) suggest to prioritize NR-DC in fast MCG recovery to reduce the work load in R18. Although there is only one company proposal, from Rapp’s perspective it is fair to do the same prioritization as we’ve done for other MRO topics (e.g., CPAC).

**Potential easy agreement**

**Proposal 1: For fast MCG recovery MRO, prioritize NR-DC scenario. if time allows, study whether the same solution can be extended for others DC scenarios.**

All companies submitted papers in fast MCG recovery agree that at least fast MCG recovery failure scenarios shall be considered for fast MCG recovery MRO, among which below sub-scenarios are proposed for consideration:

1. T316 failure Huawei/ZTE /QC/CMCC
2. SCG fails during fast MCG recovery(i.e., running of T316) Huawei/ZTE/QC/CMCC
3. SCG deactivation during fast MCG recovery (i.e., running of T316) Huawei/QC/CMCC

Two companies (Ericsson/Sharp) explicit propose to consider successful MCG recovery for fast MCG recovery, and one company (Nokia) suggest to enhance SHR which implies support of successful scenario.

One company (CMCC) propose to consider near MCG recovery failure for fast MCG recovery

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| **RAN3#117-e Agreements** SCG fails or is deactivated when the UE attempts MCG recovery (i.e. a SCG failure/deactivation while T316 is running after MCG failure) the signalling delay is longer than the time the UE waits for the response (T316 expired); other problems are not precluded if legacy MRO mechanism cannot cope with it. |

Considering the majorities views and above RAN3 agreements, below proposals are made:

**Potential easy agreement**

**Proposal 2: Consider below scenarios for fast MCG recovery MRO:**

1. **T316 failure**
2. **SCG failure/deactivation during fast MCG recovery (i.e., running of T316)**

**For further discussion**

**Proposal 3: RAN2 discuss if below scenarios needed for fast MCG recovery MRO:**

1. **Fast MCG recovery is successful**
2. **Fast MCG recover is near failure**

### On content and report enhancements

Below options are identified to be further enhanced for support fast MCG recovery MRO:

1. RLF report Lenovo, Ericsson, NTT DOCOMO,Huawei, ZTE, Samsung, Nokia, Qualcom
2. SHR Nokia

There is a majority views (8/11) to enhance RLF report for fast MCG recovery MRO while enhancement on SHR is dependent on if successful fast MCG recovery will be considered, thus it is suggested to postpone discussion on SHR enhancement until conclusion on new scenarios.

**Potential easy agreement**

**Proposal 4: RLF report is enhanced to support fast MCG recovery MRO.**

**Proposal 5: SHR enhancement for fast MCG recovery MRO is postponed.**

X out of companies propose to include information in RLF-report to help differentiate failure cause of fast MCG recovery, since the detailed values is relevant to the agreed scenarios and whether to introduce new field or extend existing field will need more consideration in ASN.1 design in stage 3. It is proposed to agree on high level principle that fast MCG recovery failure cause shall be included for fast MCG recovery optimization.

**Potential easy agreement**

**Proposal 6: Fast MCG recovery failure cause shall be included for fast MCG recovery optimization. FFS details**

In addition below information is proposed to consider for fast MCG recovery optimization:

* 1. Running time of T316 **Ericsson/Huawei/Nokia/CMCC/Sharp**
	2. SCG failure cause **Ericsson/Huawei/QC**
	3. SCG suspended/activation indication **Ericsson**
	4. SCG RRM measurements **NTT Docomo/QC/Oppo**
	5. MCGFailureInformation **NTT Docomo**
	6. Indication to indicate fast MCG recovery failure **ZTE/Samsung/Oppo**
	7. Location information **ZTE/Oppo**
	8. indication when fast MCG recovery was not initiated when T316 is configured **Samsung**
	9. Time between MCG failure and SCG failure **CMCC**
	10. Indication whether the fast MCG recovery is successful or not **Sharp**
	11. Failed PCell ID **Oppo**

Pleas noted that running time of T316 intends to cover all T316 relevant proposals, including P2/5 from Nokia, P6 from Ericsson and P3 from CMCC, since according to existing specs, UE starts T316 upon initiation of fast MCG recovery (i.e., upon transmission of MCGFailureInformation message ) and stops T316 upon reception of HO/RRC release command, therefore it can be interpreted as running time of T316.

It is proposed that RAN2 to further discuss below proposal.

**For further discussion**

**Proposal 7: RAN2 discuss which of below information is needed for fast MCG recovery optimization:**

* 1. **Running time of T316 (5/11)**
	2. **SCG failure cause 3/11)**
	3. **SCG suspended/activation indication (1/11)**
	4. **SCG RRM measurements (3/11)**
	5. **MCGFailureInformation (1/11)**
	6. **Indication to indicate fast MCG recovery failure (3/11)**
	7. **Location information (2/11)**
	8. **indication when fast MCG recovery was not initiated when T316 is configured (1/11)**
	9. **Time between MCG failure and SCG failure (1/11)**
	10. **Indication whether the fast MCG recovery is successful or not (1/11)**
	11. **Failed PCell ID (1/11)**

### On necessity of LS to RAN3

One company (Huawei) proposes to send an LS to RAN3 to inform them about RAN2 decision. Rapporteur tends to agree that an LS is helpful to sync the progress between working groups and RAN3 can work on the signalling to support RAN2’s agreements. But it is better to check other companies’ view. Therefore below proposal is made for further discussion:

**For further discussion**

**Proposal 8: RAN2 discuss whether to send the LS to RAN3 about RAN2’s agreements on fast MCG recovery MRO, and the detailed content if agreed.**

## MR-DC SCG failure

Relevant proposals are listed in below table:

|  |  |  |
| --- | --- | --- |
| **TDoc** | **Company name** | **Proposals** |
| [1] R2-2211355  | CATT | Proposal 5: RAN2 to identify the MR-DC scenarios for which to perform the SCG failure related information report in R18.Proposal 6: Identify whether the 5 information requested by RAN3 LS ‎ R3-211332 are all needed for MR-DC scenarios other than NR-DC.Proposal 7: Identify whether the SCG failure report related messages can be used for transmitting the parameters for MRO purpose in MR-DC scenarios other than NR-DC scenario.Proposal 8: It is not needed for the UE to keep and report the CPAC specific candidate PSCell list and the execution conditions to the network, since the MN keeps all the UE contexts when receiving SCG failure information message from UE. |
| R2-2212036  | Lenovo | Proposal 3: Enhance SCGFailureInformationNR message for EN-DC SCG failure, e.g. to include previousPSCellId, failedPSCellId, timeSCGFailure and RA info.Proposal 4: Enhance SCGFailureInformationNR message for NGEN-DC SCG failure, e.g. to include previousPSCellId, failedPSCellId, timeSCGFailure and RA info.Proposal 5: Enhance SCGFailureInformationEUTRA message for NE-DC SCG failure, e.g. to include previousPSCellId, failedPSCellId, timeSCGFailure and RA info. |
| R2-2212094  | Ericsson | Proposal 1 RAN2 deprioritizes NE-DC / EN-DC scenarios for SCG failure information report.Proposal 2 RAN2 prioritizes CPAC related optimization for SCG Failure information. |
| R2-2212224 | Huawei, HiSilicon | Proposal 1: Introduce the stage 2 description of PSCell change failure for (NG) EN-DC in TS36.300.Proposal 2: RAN2 to introduce inter-node RRC message to forward the SCG failure information from the MN to the SN for NE-DC and (NG) EN-DC scenarios.Proposal 3: Support Pre-R18 UE and reuse the detection solution for Pre-R17 UE for EN-DC, NGEN-DC and NE-DC scenarios.[Rapp]: P2/3 is more relevant to RAN3 instead RAN2.  |

Four companies have provide contribution on MR-DC SCG failure MRO. Among them one company suggest to de-prioritize NE-DC / EN-DC scenarios for SCG failure information report, and one company suggest to discuss whether to support all MR-DC scenarios for SCG failure information report and two companies suggest to consider all MR-DC scenarios.

Rapporteur also notice below agreements have taken by RAN3 in RAN3#117-e meeting

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| --- |
| **RAN3#117-e** Support MRO for SCG failure in EN-DC, NGEN-DC and NE-DC scenarios.Take Stage 2 descriptions of PSCell change failure in TS37.340 as baseline for NE-DC SCG failure, and necessary updates can be added on top of it if needed.Take Stage 2 descriptions of PSCell change failure in TS38.300 as baseline for NE-DC SCG failure, and necessary updates can be added on top of it if needed.Take Stage 2 descriptions of PSCell change failure in TS37.340 as baseline for NGEN-DC SCG failure, and necessary updates can be added on top of it if needed.Take Stage 2 descriptions of PSCell change failure in TS37.340 as baseline for EN-DC SCG failure, and necessary updates can be added on top of it if needed. |
| **RAN3#117-e** For MRO for MR-DC SCG failure, deprioritize dual failure case (i.e. both MCG failure and SCG failure occur). |

Rapporteur understands in order to support MR-DC SCG failure RAN3 needs to study NW interface impact and RAN2 needs to discuss the required signalling updates as well as identify potential impact on both NR/ LTE RRC specs. Considering the limited number of contributions and the work load in RAN2, it is suggested to check companies view on below proposal:

**For further discussion**

**Proposal 9: RAN2 discuss whether to deprioritizes NE-DC / EN-DC scenarios for SCG failure information report.**

If P9 is confirmed then no need to discuss other proposals in this topic. But if not companies are invited to bring papers next meeting for further discussion also based on RAN3 progress

## MRO for CPAC

Relevant proposals are listed in below table:

|  |  |  |
| --- | --- | --- |
| **TDoc** | **Company name** | **Proposals** |
| R2-2211355  | CATT | Proposal 1: RAN2 to take R17 CHO related MRO study as baseline to start the MRO discussion of R18 CPAC.Proposal 2: RAN2 focuses on the basic scenarios firstly, then discuss the mixed scenarios if time allows.Proposal 3: RAN2 to discuss which type of CPAC need to be considered for MRO and which information should be reported by UE.* R16 intra-SN CPC without MN involvement
* R17 CPA
* R17 MN initiated inter-SN CPC
* R17 SN initiated inter-SN CPC

Proposal 4: RAN2 to discuss which signalling method to be used for CPAC related failure information reporting.* SCG failure information message
* Introduce new RRC message
* Introduce new SCG RLF report
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| R2-2212035  | Lenovo | Proposal 1: The following failure cases should be considered for MRO for CPAC in NR-DC: * an SCG failure occurs before CPC is executed;
* an SCG failure occurs during CPAC execution phase;
* an SCG failure occurs shortly after successful CPAC execution.

Proposal 2: SCG Failure Information message can be enhanced to support MRO for NR-DC CPAC.Proposal 3: The UE reports the time elapsed between the SCG failure in source SCG and the latest CPC configuration is received.Proposal 4: The UE reports the time elapsed between the CPAC execution towards the target PSCell and the corresponding latest CPAC configuration is received for the target PSCell.Proposal 5: The UE reports the time elapsed since the CPAC execution towards the target PSCell until the SCG failure.Proposal 6: The UE reports the type of PSCell addition/change, i.e. CPA or CPC.Proposal 7: The UE reports the latest configured CPAC configuration including the CPAC execution condition(s) and the list of CPAC candidate PSCells. |
| R2-2212094  | Ericsson | Proposal 3 UE does not need to log CPAC configurations in the SCGFailureInformation.Proposal 4 UE reports the following information in SCGFailureInformation message:• The time elapsed between reception of CPAC configuration and the CPAC execution• The time elapsed between the two CPAC execution events e.g., A3 and A5• The first fulfilled event e.g., A3 or A5• the MCG timers such as t310 and t312 values if they are running• RLF retransmission counter value |
| R2-2212105  | NTT DOCOMO, INC. | Proposal1: Introduce the following parameters in CPAC failure report.- An indication shows whether the failure an CPA failure or CPC failure- An indication shows whether the failure is MN initiated CPA/CPC or SN initiated CPC.- Candidate PSCell info (including PCI, carrierFreq, measurement result)- timeSinceCPACReconfig |
| R2-2212224 | Huawei, HiSilicon | Proposal 4: For too early CPA execution, “no suitable PSCell found” refer to no PSCell which meets the cell selectin criterion according to measurement results. Proposal 5: In case of CPA and CPC failure scenarios, upon reception of SCGFailureInformation from MN, MN perform initial analysis, determines the failure type and forwards the SCG failure information to the corresponding node which caused the failure.Proposal 6: 11)~12) needs to be retrieved by network from inter-node coordination message between MN and source SN during the SN initiated CPC procedure for MRO for CPAC when UE successfully executes CPC towards target PSCell and shortly declares SCG RLF in target PSCell in SN initiated CPC procedure.[Rapp]: P5-6 is more relevant to RAN3.Proposal 7: 11)~12) could be derived by network from UE context in case of CPA failure, MN initiated CPC failure and SN initiated CPC failure.Proposal 8: 1), 2), 9) and 10) need to be reported by UE for MRO for CPAC. |
| R2-2212453 | Nokia, Nokia Shanghai Bell | Proposal 7: UE indicates to MN using SCGFailureInformation message whether it had stored intra-SN CPC configuration at the time of SCG failure.Proposal 8: RAN2 to discuss possible solutions for aid Target SN to prepare the correct PScells.Proposal 9: The SCGFailureInformation message may be enhanced with an indication regarding target cells that were previously reported to the network but not part of the received CPC configurations. |
| R2-2212644 | vivo | Proposal 1: CPAC failure information can be included in the existing SCGFailureInformation if MCG transmission is not suspended.Proposal 2: RAN2 to discuss whether/how CPAC failure information is reported when the MCG is suspended.Proposal 3: RAN2 to discuss the contents of the CPAC failure information in case of “Too Late CPC Execution”, the following information is at least included:1. Candidate target cell ID;
2. latest radio measurements of the candidate target cells;
3. latest radio measurements of neighbour cell(s);
4. the time between reception of the CPC configuration and SCG failure.

Proposal 4: RAN2 to discuss the contents of the CPAC failure information in case of “Too Early CPC Execution” and “CPC/CPA Execution to wrong PSCell”, the following information can be considered:1. An indication indicates that the SCG failure is due to CPAC;
2. CPAC type, e.g., CPA, MN initiated inter-SN CPC, SN initiated inter-SN CPC, SN initiated intra-SN;
3. Target PSCell ID;
4. Candidate target cell ID;
5. latest radio measurements of the candidate target cells;
6. latest radio measurements of the neighbour cell(s);
7. the time between reception of CPAC configuration and CPAC execution;
8. the time between CPAC execution and SCG failure.
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| R2-2212672 | Qualcomm | Proposal 1: Similar to rel-17 MRO for NR-DC SCG Failure reporting, use existing SCGFailureInformation for MRO for MR-DC CPAC.Proposal 2: As UE is not aware of whether a CPA or CPC procedure is MN-initiated or SN-initiated, therefore, from the RAN2 point-of-view, differentiating whether a CPA or CPC procedure is MN-initiated or SN-initiated is not required. Proposal 3: RAN2 should consider enhancements of SCGFailureInformation for the following CPC failure scenarios,* SCG failure before CPC execution
* Failed CPC execution, i.e., SCG T304 expiry
* Successful CPC execution but RLF at target PSCell immediately after Successful CPC execution

Proposal 4: RAN2 should consider enhancements of SCGFailureInformation for the following CPA failure scenarios,* Failed CPA execution, i.e., SCG T304 expiry
* Successful CPA execution but RLF at target PSCell immediately after Successful CPA execution

Proposal 5: Minimize the impact on SCGFailureInformation size by only including the relevant information for CPAC failure not available or retrieved at the network.Proposal 6: Include the following information in the SCGFailure for CPA and CPC optimization:* Indicate which configured execution event has been met if multiple execution conditions are configured at the UE
* The time gap between the reception of CPA or CPC configuration until execution or SCGFailure
* The time gap between configured execution conditions if multiple execution conditions are configured at the UE and CPA or CPC execution is performed

Proposal 7: RAN2 should deprioritize studying coexisting failure scenarios such as legacy HOF, CHO failure, or PCell RLF with CPAC failures, at least until RAN2 makes initial agreements on standalone CPAC failure scenarios. |
| R2-2212714 | CMCC | Proposal 1: RAN2 is asked to confirm the CPA/CPC scenarios agreed by RAN3 and discuss corresponding UE impacts.Proposal 2: The scenario that PCell handover happens after CPA/CPC configuration and before CPA/CPC execution is considered for CPA/CPC optimization.Proposal 3: To support the MRO for scenario in P2, UE reports one indication that before PCell handover, CPA/CPC configuration has received but not executed, or the time difference between the CPA/CPC configuration and PCell handover.Proposal 4: For CPA/CPC failure cases, UE logs following information and measurements:a) Source PSCell info (cell ID, measurement result)b) Target PScell info (cell ID, measurement result)c) Neighbour Cells info (cell ID, measurement result, CPAC Candidate cells flag)d) Success PSCell change/addition cause value (e.g., t304, t310, t312 cause, etc.)f) The time elapsed between the CPAC execution towards the target cell and the corresponding latest CPAC configuration received for the selected target cell |
| R2-2212729 | Sharp | Proposal 1: reuse SCGFailureInformation for CAPC failure information reporting for SON.Proposal 2: include the following information for CPAC failure reporting:* Time elapsed between reception of CPAC configuration and the CPAC execution;
* Indication of whether the PSCell change is a CAPC or not;
* Status of execution conditions (timeBetweenEvents, firstTriggeredEvent) for candidate cells.
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| R2-2212849 | OPPO | Proposal 1: RAN2 to agree that one indication, either in explicit way or implicit way, for highlighting whether or not the SCG failure is related to CPAC is captured in the related reporting.Proposal 2: RAN2 to discuss and down select the approach of determining whether or not the SCG failure information report regarding CPC should be sent towards the SN from MN:* MN-based method: MN memorizes the fact that it was SN initializing a CPC procedure, when the MN receives the SN Modification Request Acknowledge msg, and forwards the SCG failure information report to the SN.
* UE-based method: an indication of the initializer of the CPC procedure needs to be include in the RRC Reconfiguration msg and SCG failure information report.

Proposal 3: RAN2 to agree that the execution triggering condition set for the UE for the CPC is included in the SCG failure information report for the SN-initialized CPC procedure. |

* **RAN3 progress**

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| **RAN3#117-e** MRO for CPC and CPA based on the R17 NR-DC MRO solution |
| **RAN3#117bis-e** Not consider too late CPA.CPA Execution to wrong PSCell will be considered, e.g. UE receives CPA configuration and CPA execution condition is satisfied, CPA execution fails or an SCG failure occurs shortly after a successful CPA execution; a suitable PSCell different with target PSCell is found based on the measurements reported from the UE.Too Late CPC Execution, Too Early CPC Execution and CPC Execution to wrong PSCell will be considered: - Too Late CPC Execution: UE receives CPC configuration, while a SCG failure occurs before CPC execution condition is satisfied; a suitable PSCell different with source PSCell is found based on the measurements reported for the UE.- Too Early CPC Execution: UE receives CPC configuration and CPC execution condition is satisfied, CPC execution fails or an SCG failure occurs shortly after a successful CPC execution; source PSCell is still the suitable PSCell based on the measurements reported from the UE.- CPC Execution to wrong PSCell: UE receives CPC configuration and CPC execution condition is satisfied, CPC execution fails or an SCG failure occurs shortly after a successful CPC execution; a suitable PSCell different with source PSCell or target PSCell is found based on the measurements reported from the UE.For MRO for CPAC, deprioritize Case i/ii/iii/iv:- Case i: mixed scenarios of legacy PA and CPA, i.e. UE receives CPA configuration, a legacy PSCell addition is performed but fails, or a legacy PSCell addition is performed and succeeds but an SCG failure occurs shortly after the successful legacy PSCell addition.- Case ii: mixed scenarios of legacy PC and CPC, i.e. UE receives CPC configuration, a legacy PSCell change is performed but fails, or a legacy PSCell change is performed and succeeds but an SCG failure occurs shortly after the successful legacy PSCell change.- Case iii: MCG RLF or handover failure or CHO execution failure before CPA/CPC execution.- Case iv: CHO-CPC coexistence scenarios with low priority. |

There are multiple proposals to discuss the CPAC MRO scenarios in RAN2,which are more or less aligned with RAN3 agreements listed above. There is also one company (CMCC) propose explicitly to agree on RAN3 agreed scenarios. Considering RAN3 has already extensively discussed the CPAC MRO scenarios and normally RAN2 only follows RAN3 agreements on scenarios. Therefore Rapporteur would like ask companies to check and agree on below proposal as a start point to discuss this topic.

**Potential easy agreement:**

**Proposal 10: RAN2 confirms the CPA/CPC scenarios agreed by RAN3 and discuss corresponding UE impacts.**

In addition, 8 of 11 companies’ proposals (Lenovo/Ericsson/Huawei/Nokia/Vivo/Qualcomm/Sharp/Oppo) propose to enhance SCGFailureInformation to support CPAC MRO. One company suggest to discuss whether reuse existing SCGFailureInformation, or new RRC message or new SCG failure report, while remaining 2 companies doesn’t show explicit preference on which way to go. It is also noticed RAN3 has agreed MRO for CPC and CPA will based on the R17 NR-DC MRO solution, Rapporteur understands the intention is to enhance SCGFailureInformation message to support CPAC MRO. Considering the majority view as well as RAN3 agreements, Rapporteur suggest to agree on below proposal:

**Potential easy agreement:**

**Proposal 11: SCGFailureInformation is enhanced to support CPAC MRO (i.e, no need to introduce new reports/message).**

If general principles as proposed in P10/P11 can be agreed, RAN2 can further discuss the required information and detailed signalling design (e.g., which node to report ).

In this meeting, below information is proposed to **report by UE** for CPAC MRO, which is categorized into different categories:

* **Time relevant information**

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| --- | --- | --- |
| **Assisted information** | **Support** | **Object** |
| 1. The time elapsed between the SCG failure in source SCG and the latest CPC configuration is received.
 | Lenovo/vivo/Qualcomm |  |
| 1. The time elapsed between the CPAC execution towards the target PSCell and the corresponding latest CPAC configuration is received for the target PSCell.
 | Lenovo/CMCC |  |
| 1. The time elapsed since the CPAC execution towards the target PSCell until the SCG failure.
 | Lenovo |  |
| 1. timeSinceCPACReconfig
 | NTT DOCOMO |  |
| 1. The time elapsed between reception of CPAC configuration and the CPAC execution
 | Ericsson/vivo/Qualcomm/Sharp |  |

Based on above, it is propose to first discuss which kind of time information is needed. And further RAN2 can discuss whether it can be derived or reused based on existing IEs or new IEs are needed.

**For further discussion:**

**Proposal 12: For CPAC MRO, RAN2 discuss which of below time information is needed to be reported by UE (ffs reusing existing existing new IEs or introducing new IEs ):**

1. **The time elapsed between reception of CPAC configuration and the CPAC execution (4)**
2. **The time elapsed between the SCG failure in source SCG and the latest CPC configuration is received. (3)**
3. **The time elapsed between the CPAC execution towards the target PSCell and the corresponding latest CPAC configuration is received for the target PSCell. (2)**
4. **The time elapsed since the CPAC execution towards the target PSCell until the SCG failure. (1)**
5. **timeSinceCPACReconfig (1)**
* **CPAC type relevant**

|  |  |  |
| --- | --- | --- |
| **Assisted information** | **Support** | **Object** |
| 1. Information to differentiate CPA failure or CPC failure
 | Lenovo/NTT DOCOMO |  |
| 1. An indication shows whether the failure is MN initiated CPA/CPC or SN initiated CPC.
 | NTT DOCOMO  | Qualcomm |
| 1. CPAC type, e.g.,CPA, MN initiated inter-SN CPC, SN initiated inter-SN CPC, SN initiated intra-SN
 | vivo |  |
| 1. indication indicates that the SCG failure is due to CPAC;
 | Vivo/Sharp/Oppo (explicit or implicit) |  |

Above proposals are intend to include information to allow differentiation of CAPC failure from conventional SCG failure. Rapporteur tends to agree at least information to allow differentiation of CPAC from conventional SCG failure is needed, whether explicit indication is needed or it can be implicit can wait for conclusion from other topics. Therefore it is suggested to agree on below proposal:

**Potential easy agreement:**

**Proposal 13: For CPAC MRO, information to differentiate CAPC from conventional SCG failure is needed (ffs by implicit or explicit indication).**

Furthermore, there are also proposals to allow further differentiation of CPAC failure types, e.g., CPA/CPC, whether it is MN initiated or SN initiated. There are comments from Qualcomm that UE cannot know the type or NW node that initate the CPAC procedure. Based on the diverse views, below proposal is made for further discussion:

**For further discussion:**

**Proposal 14: For CPAC MRO, RAN2 discuss whether below type information is needed (ffs details):**

* 1. **Information to differentiate CPA and CPC**
	2. **Information to differentiate SN or MN initiated CPAC procedure**
	3. **None**
* **CPAC configuration relevant**

|  |  |  |
| --- | --- | --- |
| **Assisted information** | **Support** | **Object** |
| 1. The time elapsed between the two CPAC execution events e.g., A3 and A5
 | Ericsson/Huawei/Qualcomm/Sharp |  |
| 1. The first fulfilled event e.g., A3 or A5
 | Ericsson, Huawei/Sharp |  |
| 1. The latest configured CPAC configuration including the CPAC execution condition(s)
 | Lenovo Oppo(for the SN-initialized CPC procedure) | Ericsson/Huawei(can be derived) |
| 1. CPAC execution condition(s) fulfilled
 | Huawei/Qualcomm |  |
| 1. indication whether UE had stored intra-SN CPC configuration at the time of SCG failure.
 | Nokia |  |
| 1. an indication regarding target cells that were previously reported to the network but not part of the received CPC configurations.
 | Nokia |  |

Above proposals are relevant on CAPC configuration. Since it is first time we discuss CPAC relevant report, it is propose to further check companies’ views on each information separately. Below proposal is made for further discussion:

**For further discussion:**

**Proposal 15: For CPAC MRO, RAN2 discuss which below CPAC configuration relevant information is needed:**

* 1. **The time elapsed between the two CPAC execution events e.g., A3 and A5 (4)**
	2. **The first fulfilled event e.g., A3 or A5 (3)**
	3. **The latest configured CPAC configuration including the CPAC execution condition(s) (2)**
	4. **CPAC execution condition(s) fulfilled (2)**
	5. **indication whether UE had stored intra-SN CPC configuration at the time of SCG failure. (1)**
	6. **an indication regarding target cells that were previously reported to the network but not part of the received CPC configurations. (1)**
	7. **None**
* **Measurements relevant**

|  |  |  |
| --- | --- | --- |
| **Assisted information** | **Support** | **Object** |
| 1. CPAC candidate PSCells identity
 | Lenovo/NTT DOCOMO/Vivo | Huawei(can be derived) |
| 1. Candidate PSCell measurement results
 | NTT DOCOMO/vivo |  |
| 1. the latest neighboring cell measurement results
 | Huawei/CMCC/vivo |  |
| 1. an indication on whether a measured neighbour cell was configured as a CPAC candidate or not
 | Huawei/CMCC |  |
| 1. Source PSCell info (cell ID and measurements)
 | CMCC |  |
| 1. Target PSCell ID;
 | Vivo |  |
| 1. Target PSCell measurements
 | CMCC |  |

Above proposals are relevant on CAPC relevant measurements. Since it is first time we discuss CPAC relevant report, it is propose to further check companies’ views on each information separately. Below proposal is made for further discussion:

**For further discussion:**

**Proposal 16: For CPAC MRO, RAN2 discuss which below measurements relevant information is needed:**

* 1. **CPAC candidate PSCells identity (3)**
	2. **Candidate PSCell measurement results (2)**
	3. **the latest neighboring cell measurement results (3)**
	4. **an indication on whether a measured neighbour cell was configured as a CPAC candidate or not (2)**
	5. **Source PSCell info (cell ID and measurements) (1)**
	6. **Target PSCell ID; (1)**
	7. **Target PSCell measurements (1)**
	8. **None**
* **Others**

|  |  |  |
| --- | --- | --- |
| **Assisted information** | **Support** | **Object** |
| 1. the MCG timers such as t310 and t312 values if they are running
 | Ericssson |  |
| 1. RLF retransmission counter value
 | Ericssson |  |
| 1. one indication that before PCell handover, CPA/CPC configuration has received but not executed or the time difference between the CPA/CPC configuration and PCell handover
 | CMCC |  |
| 1. Success PSCell change/addition cause value (e.g., t304, t310, t312 cause, etc.)
 | CMCC |  |

Above proposals are CAPC relevant information that is raised by single company. Since it is first time we discuss CPAC relevant report, it is propose to further check companies’ views on each information separately. Below proposal is made for further discussion:

**For further discussion:**

**Proposal 17: For CPAC MRO, RAN2 discuss which below information is needed:**

* 1. **the MCG timers such as t310 and t312 values if they are running**
	2. **RLF retransmission counter value**
	3. **one indication that before PCell handover, CPA/CPC configuration has received but not executed or the time difference between the CPA/CPC configuration and PCell handover**
	4. **Success PSCell change/addition cause value (e.g., t304, t310, t312 cause, etc.)**
	5. **None**

# Conclusion

Based on analysis in section 2, following proposals are made for further discussion, and some proposals are only discussed under certain conditions.

## Fast MCG recovery

**Potential easy agreements**

**Proposal 1: For fast MCG recovery MRO, prioritize NR-DC scenario. if time allows, study whether the same solution can be extended for others DC scenarios.**

**Proposal 2: Consider below scenarios for fast MCG recovery MRO:**

1. **T316 failure**
2. **SCG failure/deactivation during fast MCG recovery (i.e., running of T316)**

**Proposal 4: RLF report is enhanced to support fast MCG recovery MRO.**

**Proposal 5: SHR enhancement for fast MCG recovery MRO is postponed.**

**Proposal 6: Fast MCG recovery failure cause shall be included for fast MCG recovery optimization. FFS details**

**For further discussion**

**Proposal 3: RAN2 discuss if below scenarios needed for fast MCG recovery MRO:**

1. **Fast MCG recovery is successful**
2. **Fast MCG recover is near failure**

**Proposal 7: RAN2 discuss which of below information is needed for fast MCG recovery optimization:**

1. **Running time of T316 (5/11)**
2. **SCG failure cause 3/11)**
3. **SCG suspended/activation indication (1/11)**
4. **SCG RRM measurements (3/11)**
5. **MCGFailureInformation (1/11)**
6. **Indication to indicate fast MCG recovery failure (3/11)**
7. **Location information (2/11)**
8. **indication when fast MCG recovery was not initiated when T316 is configured (1/11)**
9. **Time between MCG failure and SCG failure (1/11)**
10. **Indication whether the fast MCG recovery is successful or not (1/11)**
11. **Failed PCell ID (1/11)**

**Proposal 8: RAN2 discuss whether to send the LS to RAN3 about RAN2’s agreements on fast MCG recovery MRO, and the detailed content if agreed.**

## MR-DC SCG failure

**For further discussion**

**Proposal 9: RAN2 discuss whether to deprioritize NE-DC / EN-DC scenarios for SCG failure information report.**

## MRO for CPAC

**Potential easy agreements:**

**Proposal 10: RAN2 confirms the CPA/CPC scenarios agreed by RAN3 and discuss corresponding UE impacts.**

**Proposal 11: SCGFailureInformation is enhanced to support CPAC MRO (i.e, no need to introduce new reports/message).**

**Proposal 13: For CPAC MRO, information to differentiate CAPC from conventional SCG failure is needed (ffs by implicit or explicit indication).**

**For further discussion:**

**Proposal 12: For CPAC MRO, RAN2 discuss which of below time information is needed to be reported by UE (ffs reusing existing existing new IEs or introducing new IEs ):**

1. **The time elapsed between reception of CPAC configuration and the CPAC execution (4)**
2. **The time elapsed between the SCG failure in source SCG and the latest CPC configuration is received. (3)**
3. **The time elapsed between the CPAC execution towards the target PSCell and the corresponding latest CPAC configuration is received for the target PSCell. (2)**
4. **The time elapsed since the CPAC execution towards the target PSCell until the SCG failure. (1)**
5. **timeSinceCPACReconfig (1)**

**Proposal 14: For CPAC MRO, RAN2 discuss whether below type information is needed (ffs details):**

1. **Information to differentiate CPA and CPC**
2. **Information to differentiate SN or MN initiated CPAC procedure**
3. **None**

**Proposal 15: For CPAC MRO, RAN2 discuss which below CPAC configuration relevant information is needed:**

1. **The time elapsed between the two CPAC execution events e.g., A3 and A5 (4)**
2. **The first fulfilled event e.g., A3 or A5 (3)**
3. **The latest configured CPAC configuration including the CPAC execution condition(s) (2)**
4. **CPAC execution condition(s) fulfilled (2)**
5. **indication whether UE had stored intra-SN CPC configuration at the time of SCG failure. (1)**
6. **an indication regarding target cells that were previously reported to the network but not part of the received CPC configurations. (1)**
7. **None**

**Proposal 16: For CPAC MRO, RAN2 discuss which below measurements relevant information is needed:**

1. **CPAC candidate PSCells identity (3)**
2. **Candidate PSCell measurement results (2)**
3. **the latest neighboring cell measurement results (3)**
4. **an indication on whether a measured neighbour cell was configured as a CPAC candidate or not (2)**
5. **Source PSCell info (cell ID and measurements) (1)**
6. **Target PSCell ID; (1)**
7. **Target PSCell measurements (1)**
8. **None**

**Proposal 17: For CPAC MRO, RAN2 discuss which below information is needed:**

1. **the MCG timers such as t310 and t312 values if they are running**
2. **RLF retransmission counter value**
3. **one indication that before PCell handover, CPA/CPC configuration has received but not executed or the time difference between the CPA/CPC configuration and PCell handover**
4. **Success PSCell change/addition cause value (e.g., t304, t310, t312 cause, etc.)**
5. **None**

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