**3GPP TSG RAN WG2#119bis-e R2-22xxxxx**

**Electronic meeting, 10th October - 19th October, 2022**

**Source: ZTE Corporation, Sanechips**

**Title: Summary on MRO for inter-system handover for voice fallback**

**Agenda item:** **8.13.2**

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

# Introduction

This document provides the summary of the contributions submitted to agenda item 8.13.2 MRO for inter-sytem handover for voice fallback, focusing on UE impacts.

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

## Background

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| **RAN2#119-e agreements** 1 RAN2 to include an indication regarding voice fallback in the RLF report. FFS: implicit or explicit flag and other details.2 RAN2 discuss the following scenarios:  Suitable EUTRA cell found after MobilityFromNR failure No suitable EUTRA cell found after MobilityFromNR failure |

Above agreements are made in RAN2#119-e, and below contributions submitted intends to address the ffs issue and discuss which kind of information is needed for differentiation between scenarios in agreement 2, and the possibilities to reusing existing fields or if new fields are needed.

## RLF report relevant enhancements

### Necessity of explicit indication for voice fallback failure

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| **TDoc** | **Company name** | **Proposals** |
| [R2-2209569](file://D://3GPP%20Sync%5CRAN2%5CTSGR2_119bis-e%5CDocs%5CR2-2209569.zip) | CATT | **Proposal 1: Introduce an explicit indication regarding voice fallback in the RLF report.** |
| [R2-2209728](file://D://3GPP%20Sync%5CRAN2%5CTSGR2_119bis-e%5CDocs%5CR2-2209728.zip) | OPPO | **Proposal 1: RAN2 to agree using the explicit flag for indication of the purpose of voicefallback in the RLF report.** |
| [R2-2209827](file://D://3GPP%20Sync%5CRAN2%5CTSGR2_119bis-e%5CDocs%5CR2-2209827.zip)  | Samsung R&D Institute India | **Proposal 1: An explicit indication is provided to indicate voice fallback in the RLF Report.****Proposal 2: RAN2 to discuss whether to add a new flag or add a new type for lastHO-Type-r17 to indicate voice fallback.** |
| [R2-2209864](file://D://3GPP%20Sync%5CRAN2%5CTSGR2_119bis-e%5CDocs%5CR2-2209864.zip) | Huawei | **Proposal 1: Introduce the explicit indicator to indicate the voice fallback in the RLF report.** |
| [R2-2209955](file://D://3GPP%20Sync%5CRAN2%5CTSGR2_119bis-e%5CDocs%5CR2-2209955.zip) | Lenovo | **Proposal 1: Include an explicit indication concerning whether the failed inter-system inter-RAT handover was triggered for voice fallback in the RLF report.** |
| [R2-2210037](file://D://3GPP%20Sync%5CRAN2%5CTSGR2_119bis-e%5CDocs%5CR2-2210037.zip) | Xiaomi | **Proposal 1: The presence of a voice fallback IE( Enumerated {true}) in VarRLF-Report is used to indicate that HO type is for voice fallback.** |
| [R2-2210183](file://D://3GPP%20Sync%5CRAN2%5CTSGR2_119bis-e%5CDocs%5CR2-2210183.zip) | Ericsson | [**Proposal 3 UE does not need to log an explicit indication that RLF report concerns a voice fallback HO.**](#_Toc115350429) |
| [R2-2210287](file://D://3GPP%20Sync%5CRAN2%5CTSGR2_119bis-e%5CDocs%5CR2-2210287.zip) | ZTE Corporation, Sanechips | **Proposal 1: RAN2 to discuss and select either option 1 or option 3 for RLF report enhancement when mobilioty from NR fails and vo*iceFallbackIndication* is included in the *MobilityFromNRCommand* message:*** **Opt1: One bit explicit indication in RLF-report to indicate whether vo*iceFallbackIndication* is included in the *MobilityFromNRCommand* message or not;**
* **Opt3: Explicit indication to indicate whether suitable EUTAR cell is found or not.**
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| [R2-2210300](file://D://3GPP%20Sync%5CRAN2%5CTSGR2_119bis-e%5CDocs%5CR2-2210300.zip) | Qualcomm  | **Proposal 2: To differentiate voice fallback from regular inter-RAT handover, include a voiceFallbackIndication indication in the RLF report, if the MobilityFromNRCommand includes voiceFallbackIndication IE.** |
| [R2-2210510](file://D://3GPP%20Sync%5CRAN2%5CTSGR2_119bis-e%5CDocs%5CR2-2210510.zip) | CMCC | **Proposal 1: RAN2 wait the progress of RAN3 or send LS to ask RAN3 to discuss and decide whether to introduce the new failure that an RLF occurs shortly after a successful handover from a cell belonging to an NG-RAN node to a target cell belonging to an E-UTRAN node for Inter-system/ Too Early Handover.****Proposal 2: If the new failure scenario is agreed, one indication for voice fallback could be introduced in RLF report to differentiate the voice fallback from conventional inter-RAT handover.** |
| [R2-2210632](file://D://3GPP%20Sync%5CRAN2%5CTSGR2_119bis-e%5CDocs%5CR2-2210632.zip) | NTT DOCOMO | **Proposal1: Introduce an explicit indication for voice fallback failure in RLF report.** |

Based on contributions, 9 out of 11 companies (including ZTE which has listed it as one option for consideration) propose in their papers that to introduce an explicit indication in RLF-report when mobility from NR fails andthe MobilityFromNRCommand includes voiceFallbackIndication IE to allow differentiate voice fallback failure from normal inter-system HO failure.

One company (Ericsson: [R2-2210183](file://D://3GPP%20Sync%5CRAN2%5CTSGR2_119bis-e%5CDocs%5CR2-2210183.zip) ) consider explicit indication is unnecessary and this information can be implicitly indicated based on the EUTRA cell presented in *reestablishementCellId.*

One company (CMCC: [R2-2210632](file://D://3GPP%20Sync%5CRAN2%5CTSGR2_119bis-e%5CDocs%5CR2-2210632.zip)) thinks RAN2 shall wait for RAN3’s confirmation on scenarios since existing inter-System MRO scenarios doesn’t consider voice fallback failures.

It can be observed that there is a vast majority to support explicit indication, but considering at least one NW vendor and one operator still have doubts, it is suggested to discuss further online based on below proposal:

**For online discussion**

**Proposal 1: An explicit indication is included in RLF-report when mobility from NR fails and the corresponding *MobilityFromNRCommand* includes *voiceFallbackIndication* (9/11)**

Furthermore, one company (Samsung R&D Institute India: R2-2209827) goes one-step further on the detailed signalling design, asking RAN2 to discuss whether to introduce a new flag or add a new type in lastHO-Type-r17 for purpose as indicated in proposal 1. And one company propose to use new flag with Enumerate{TRUE} type for this purpose. Considering this is stage 3 issue it is not urgent to be decided right now , thus it is suggested to discuss if P1 is agreed and if time allows.

**Discussed if time allows**

**Proposal 1-1: RAN2 discuss how to indicate the explicit indication as agreed in P1 based on below options:**

* **Opt1: New one-bit flag**
* **Opt2: Extend lastHO-Type-r17 with new type field**

### Differentiation between (no)suitable EUTRA cell found

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| **TDoc** | **Company name** | **Proposals** |
| [R2-2209569](file://D://3GPP%20Sync%5CRAN2%5CTSGR2_119bis-e%5CDocs%5CR2-2209569.zip) | CATT | **Proposal 2: To distinguish the Suitable / No suitable EUTRA cell found after MobilityFromNR failure scenarios, no new indicator is needed in the RLF report besides the voice fallback indication** |
| [R2-2209728](file://D://3GPP%20Sync%5C%5CRAN2%5C%5CTSGR2_119bis-e%5C%5CDocs%5C%5CR2-2209728.zip) | OPPO | **Proposal 2: RAN2 to agree to include the suitable E-UTRA cell in the reconnectCellId IE in the RLF-report to assist the network to recognize the E-UTRA cell for further optimization.** |
| [R2-2209827](file://D://3GPP%20Sync%5CRAN2%5CTSGR2_119bis-e%5CDocs%5CR2-2209827.zip)  | Samsung R&D Institute India | **Proposal 3: Network can optimise the scenarios where a suitable EUTRA Cell was found and connection establishment was successful after MobilityFromNR failure using reconnectCellId.** **Proposal 4: RAN2 to discuss whether there is any need for additional information when a suitable E-UTRA cell was found but connection establishment is not successful.****Proposal 5: Network can optimise the scenario where a suitable EUTRA Cell was not found after MobilityFromNR failure using reestablishmentCellId.** |
| [R2-2209955](file://D://3GPP%20Sync%5CRAN2%5CTSGR2_119bis-e%5CDocs%5CR2-2209955.zip) | Lenovo | **Proposal 2: No explicit indication concerning whether there was a suitable E-UTRA cell after voice fallback failure is needed in the RLF report.** |
| [R2-2210037](file://D://3GPP%20Sync%5CRAN2%5CTSGR2_119bis-e%5CDocs%5CR2-2210037.zip) | Xiaomi | **Proposal 2: No need to introduce additional IE in VarRLF-Report to indicate whether suitable EUTRA cell is found.** |
| [R2-2210183](file://D://3GPP%20Sync%5CRAN2%5CTSGR2_119bis-e%5CDocs%5CR2-2210183.zip) | Ericsson | [**Proposal 1 The suitable LTE cell that UE selects after HOF due to voiceFallback is logged as reestablishementCellId in the RLF report. Hence explicit flag is not needed.**](#_Toc115350427)[**Proposal 2 UE logs an indication in RLF report that no E-UTRAN suitable cell was found after HOF due to voiceFallback.**](#_Toc115350428) |
| [R2-2210287](file://D://3GPP%20Sync%5CRAN2%5CTSGR2_119bis-e%5CDocs%5CR2-2210287.zip) | ZTE Corporation, Sanechips | **Proposal 1: RAN2 to discuss and select either option 1 or option 3 for RLF report enhancement when mobilioty from NR fails and vo*iceFallbackIndication* is included in the *MobilityFromNRCommand* message:*** **Opt1: One bit explicit indication in RLF-report to indicate whether vo*iceFallbackIndication* is included in the *MobilityFromNRCommand* message or not;**
* **Opt3: Explicit indication to indicate whether suitable EUTAR cell is found or not.**
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| [R2-2210300](file://D://3GPP%20Sync%5CRAN2%5CTSGR2_119bis-e%5CDocs%5CR2-2210300.zip) | Qualcomm  | **Proposal 1: For voice fallback failure reporting in the RLF reporting, follow the existing UE behavior, i.e., when a suitable EUTRA cell is found after voice fallback failure then UE includes the EUTRA cell identity as reconnectCellID.** **Proposal 3: No suitable E-UTRA cell found after MobilityFromNR failure can be implicitly determined by the presence of reestablishmentCellId and voiceFallbackIndication in the RLF report.**  |
| [R2-2210632](file://D://3GPP%20Sync%5C%5CRAN2%5C%5CTSGR2_119bis-e%5C%5CDocs%5C%5CR2-2210632.zip) | NTT DOCOMO | **Proposal3: In case suitable EUTRA cell found after MobilityFromNR failure, UE include explicit indication for voice fallback failure in RLF report.****Proposal4: In case o suitable EUTRA cell found after MobilityFromNR failure, UE include “voiceFallbackFailure” and “no suitable E-UTRA cell found” in RLF report.** |

Based on above proposals the analysis below options of UE behavior are identified separately for suitable EUTRA cell is found and no suitable EUTRA cell is found:

* Option 1:
* UE includes selected E-UTRA cell in reconnectedCellId when suitable EUTRA cell is selected
* UE includes reestablishmentCellId when there is no E-UTRA cell is found after HOF due to voiceFallback
* Option 2:
* UE includes selected E-UTRA cell in reestablishmentCellId when suitable EUTRA cell is selected
* UE includes one indication to indicate there is no E-UTRA cell is found after HOF due to voiceFallback
* Option 3:
* For both cases, UE includes one indication to indicate whether suitable EUTRA cell is found or not
* Option 4：
* UE includes re-established NR cell in *reestablishmentCellId* when suitable NR cell is selected
* UE includes *noSuitableCellFound* field if neither NR suitable cell nor E-UTRA cell can be found by the UE
* UE selects a suitable E-UTRA cell can be marked if neither *reestablishmentCellId* field is included nor *noSuitableCellFound* field is set to true.

Option 1 is explicitly supported by Samsung([R2-2209827](file://D://3GPP%20Sync%5CRAN2%5CTSGR2_119bis-e%5CDocs%5CR2-2209827.zip))/QC([R2-2210300](file://D://3GPP%20Sync%5CRAN2%5CTSGR2_119bis-e%5CDocs%5CR2-2210300.zip)) Furthermore CATT([R2-2209569](file://D://3GPP%20Sync%5CRAN2%5CTSGR2_119bis-e%5CDocs%5CR2-2209569.zip))/OPPO([R2-2209728](file://D://3GPP%20Sync%5CRAN2%5CTSGR2_119bis-e%5CDocs%5CR2-2209728.zip))/Xiaomi([R2-2210037](file://D://3GPP%20Sync%5CRAN2%5CTSGR2_119bis-e%5CDocs%5CR2-2210037.zip))/Lenovo([R2-2209955](file://D://3GPP%20Sync%5CRAN2%5CTSGR2_119bis-e%5CDocs%5CR2-2209955.zip))and Huawei([R2-2209864](file://D://3GPP%20Sync%5CRAN2%5CTSGR2_119bis-e%5CDocs%5CR2-2209864.zip)) also give similar analysis in their contributions, though it is not 100% reflected in their proposals. NTT Docomo ([R2-2210632](file://D://3GPP%20Sync%5CRAN2%5CTSGR2_119bis-e%5CDocs%5CR2-2210632.zip)) supports parts of option 1(i.e., including selected EUTRA cell as reconnectedCellId).

Option 2 is proposed by Ericsson ([R2-2210183](file://D://3GPP%20Sync%5CRAN2%5CTSGR2_119bis-e%5CDocs%5CR2-2210183.zip)). For this option, in case suitable cell is selected, suitable EUTRA cell id is included in reestablishmentCellId, and in case no EUTRA cell is found, one explicit indication is used, while reestablishment Cell id is not included. In addition, NTT Docomo ([R2-2210632](file://D://3GPP%20Sync%5CRAN2%5CTSGR2_119bis-e%5CDocs%5CR2-2210632.zip)) also consider it is beneficial to have one explicit indication to indicate no suitable cell is found.

Option 3 is proposed by ZTE([R2-2210287](file://D://3GPP%20Sync%5CRAN2%5CTSGR2_119bis-e%5CDocs%5CR2-2210287.zip)), for this option one indication is used to indicate whether suitable EUTRA is found or not. The same as option 2 the reestablishement cell id is will not be included.Option 4 is proposed by CATT( R2-2209569), for this option, UE selects a suitable E-UTRA cell can be marked if neither *reestablishmentCellId* field is included nor *noSuitableCellFound* field is set to true, no spec impact will be introduced.

**In case suitable cell is found,** since existing UE behavior supports logging selected EUTRA cell in reconnectedCellId, and there is only one company propose to log the same information in reestablishmentCellId, which seems to be redundant. To confirm the understanding and make sure companies are on the same page for discussion, it is proposed to confirm below understanding:

**For easy agreement:**

**Proposal 2: RAN2 confirms UE include selected EUTRA cell id as reconnectedCellId in RLF report (no specs impact)**

**In case no suitable cell is found,** majorities (7 out of 11) support to log reestablishmentCellId as implicit indication, yet it is also noticed that in the continuations companies shows support of option 1 because it is existing UE behavior. However after further check, Rapporteur thinks based on prescription below, UE will not include reestablishmentCellId for reestablishment procedure due to mobility From NR failure .

**Existing UE behavior:**

-------------------------------- From 38331 --------------------------------------

The UE shall set the contents of *RRCReestablishmentRequest* message as follows:

1> if the procedure was initiated due to **radio link failure as specified in 5.3.10.3 or reconfiguration with sync failure as specified in 5.3.5.8.3:**

2> set the *reestablishmentCellId* in the *VarRLF-Report* to the global cell identity of the selected cell;

-------------------------------- From 38331 --------------------------------------

Two companies consider explicit indication instead of reestablishmentCellId is better. Since the preference on reestablishmentCellId might be based on false observation, therefore it is proposed RAN2 to further discuss among two options.

**For online discussion:**

**Proposal 3: RAN2 discuss which of below content is included when reestablishment procedure is initiated due to mobility From NR failure.**

1. **reestablihsmentCellID**
2. **Explicit indication that no suitable cell is found**

### Additional information

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| **TDoc** | **Company name** | **Proposals** |
| [R2-2210183](file://D://3GPP%20Sync%5CRAN2%5CTSGR2_119bis-e%5CDocs%5CR2-2210183.zip) | Ericsson | [**Proposal 4 RAN2 enable distinguishing an acceptable cell from a suitable cell in the RLF report.**](#_Toc115350430)[**Proposal 5 UE includes un-fetched early measurements in the RLF report after experiencing HOF for a voice fallback handover.**](#_Toc115350431) |
| [R2-2210632](file://D://3GPP%20Sync%5CRAN2%5CTSGR2_119bis-e%5CDocs%5CR2-2210632.zip) | NTT DOCOMO | **Proposal2: Introduce an explicit indication for voice fallack failure for emergency call in RLF report.** |

Apart from proposals relevant to the ffs issues and agreed scenarios for study, two companies propose to includes more information in RLF-report relevant to mobility from NR failure due to voice fallback. It is suggest to discuss further whether the information is needed or not.

**For online discussion:**

**Proposal 4: RAN2 discuss if below information is needed in RLF-report for mobility from NR failure due to voice fallback:**

1. **Indication to distinguishing an acceptable cell from a suitable cell**
2. **un-fetched early measurements**
3. **explicit indication for voice fallback failure for emergency call**

## Other aspects

On new scenarios

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| **TDoc** | **Company name** | **Proposals** |
| [R2-2209864](file://D://3GPP%20Sync%5CRAN2%5CTSGR2_119bis-e%5CDocs%5CR2-2209864.zip) | Huawei | **Proposal 2: Consider the enhancement on UHI to identify the voice fallback.****Proposal 3: Redirection case for inter-system voice fallback is considered.** |

[Rapp comments]: Above proposals is not relevant to identified scenarios, thus itb is suggested to discuss only time allows.

For MR-DC SCG failure

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| **TDoc** | **Company name** | **Proposals** |
| [R2-2209569](file://D://3GPP%20Sync%5CRAN2%5CTSGR2_119bis-e%5CDocs%5CR2-2209569.zip) | CATT | **Proposal 3: RAN2 to identify the MR-DC scenarios for which to perform the SCG failure related information report in R18.****Proposal 4: Identify whether the 5 information requested by RAN3 LS ‎ R3-211332 are all needed for MR-DC scenarios other than NR-DC.****Proposal 5: 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 6: 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.** |

[Rapp comments]: Above proposals are out of scope of AI 8.1.3.2, thus suggested to be discussed in 8.13.8 if needed.

# Conclusion

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

**For easy agreement:**

**Proposal 2: RAN2 confirms UE includes selected EUTRA cell id as reconnectedCellId in RLF report (no specs impact).**

**For online discussion**

**Proposal 1: An explicit indication is included in RLF-report when mobility from NR fails and the corresponding *MobilityFromNRCommand* includes *voiceFallbackIndication* (9/11)**

**Proposal 3: RAN2 discuss which of below content is included in RLF-report when reestablishment procedure is initiated due to mobility From NR failure.**

1. **reestablishmentCellID (7, 2 via proposal, 5 via observations)**
2. **Explicit indication that no suitable cell is found (2 )**

**Proposal 4: RAN2 discuss if below information is needed in RLF-report for mobility from NR failure due to voice fallback:**

1. **Indication to distinguishing an acceptable cell from a suitable cell**
2. **un-fetched early measurements**
3. **explicit indication for voice fallback failure for emergency call**

**Discussed if time allows**

**[Discussed only if P1 is agreed] P1-1: RAN2 discuss how to indicate the explicit indication as agreed in P1 based on below options:**

* **Opt1: New one-bit flag**
* **Opt2: Extend lastHO-Type-r17 with new type field**

**Proposal 5: Consider the enhancement on UHI to identify the voice fallback.**

**Proposal 6: Redirection case for inter-system voice fallback is considered.**

# Reference

1. [R2-2209569](file://D://3GPP%20Sync%5CRAN2%5CTSGR2_119bis-e%5CDocs%5CR2-2209569.zip) Data Collection for MRO Related Enhancements CATT discussion Rel-18 NR\_ENDC\_SON\_MDT\_enh2-Core
2. [R2-2209728](file://D://3GPP%20Sync%5CRAN2%5CTSGR2_119bis-e%5CDocs%5CR2-2209728.zip) Further discussion on MRO of inter-system HO voice fallback OPPO discussion Rel-17 NR\_ENDC\_SON\_MDT\_enh2-Core
3. [R2-2209827](file://D://3GPP%20Sync%5CRAN2%5CTSGR2_119bis-e%5CDocs%5CR2-2209827.zip) MRO for inter-system handover for voice fallback Samsung R&D Institute India discussion
4. [R2-2209864](file://D://3GPP%20Sync%5CRAN2%5CTSGR2_119bis-e%5CDocs%5CR2-2209864.zip) Discussion on the inter-system handover for voice fallback Huawei, HiSilicon discussion Rel-18 NR\_ENDC\_SON\_MDT\_enh2-Core
5. [R2-2209955](file://D://3GPP%20Sync%5CRAN2%5CTSGR2_119bis-e%5CDocs%5CR2-2209955.zip) MRO for inter-system handover for voice fallback Lenovo discussion Rel-18
6. [R2-2210037](file://D://3GPP%20Sync%5CRAN2%5CTSGR2_119bis-e%5CDocs%5CR2-2210037.zip) Discussion on inter-system handover voice fallback Xiaomi discussion Rel-18
7. [R2-2210183](file://D://3GPP%20Sync%5CRAN2%5CTSGR2_119bis-e%5CDocs%5CR2-2210183.zip) MRO for inter-system handover for voice fallback Ericsson discussion NR\_ENDC\_SON\_MDT\_enh2-Core
8. [R2-2210287](file://D://3GPP%20Sync%5CRAN2%5CTSGR2_119bis-e%5CDocs%5CR2-2210287.zip) Consideration on MRO for inter-system handover for voice fallback ZTE Corporation, Sanechips discussion Rel-18
9. [R2-2210300](file://D://3GPP%20Sync%5CRAN2%5CTSGR2_119bis-e%5CDocs%5CR2-2210300.zip) Data collection for MRO for inter-system handover for voice fallback Qualcomm Incorporated discussion Rel-18
10. [R2-2210510](file://D://3GPP%20Sync%5CRAN2%5CTSGR2_119bis-e%5CDocs%5CR2-2210510.zip) MRO for inter-system handover for voice fallback CMCC discussion Rel-18 NR\_ENDC\_SON\_MDT\_enh2-Core
11. [R2-2210632](file://D://3GPP%20Sync%5CRAN2%5CTSGR2_119bis-e%5CDocs%5CR2-2210632.zip) Further discussion on MRO enhancement for inter-system handover for voice fallback NTT DOCOMO, INC. discussion Rel-18