**3GPP TSG-RAN WG3 Meeting #125 *R3-244751***

**Maastricht, The Netherlands, 19-23 August 2024**

Agenda Item: 9.1

Source: Ericsson (moderator)

Title: Summary of Offline Discussion for CB: # 5\_NewCauseValue

Document for: Discussion

# Introduction

**CB: # 5\_NewCauseValue**

**- Check the use case and if new cause value is needed?** (moderator – E///)

Summary of offline disc

# For the Chair’s Notes

**No consensus on introducing new cause value or adding new interpretation to existing cause value in S1AP spec.**

**Source eNB implementation can avoid HO attempts of RedCap/eRedCap/2RxXR UE to target gNB not supporting such UE on cell level.**

# Discussion

## Use case

The use case discussed is that of a UE performing inter-system inter-RAT HO from eNB to target gNB.

TS 38.300 mentions the following scenarios:

|  |
| --- |
| *NOTE: It is up to the E-UTRA network, if possible, to avoid handover attempts of a RedCap UE to a target NR cell not supporting RedCap. It is up to the RedCap UE implementation, if possible, to recover from handover attempts to a target NR cell not supporting RedCap.* |
| *NOTE: It is up to the E-UTRA network, if possible, to avoid handover attempts of an (e)RedCap UE to a target NR cell not supporting (e)RedCap. It is up to the (e)RedCap UE implementation, if possible, to recover from handover attempts to a target NR cell not supporting (e)RedCap.* |
| *NOTE: It is up to the E-UTRA network, if possible, to avoid handover attempts of a 2Rx XR UE to a target NR cell not allowing 2Rx XR UEs as specified in TS 36.300. It is up to UE implementation, if possible, to recover from handover attempts to a target NR cell not allowing 2Rx XR UEs.* |

The spec clearly hints that there are use cases where a source eNB knows that UE is of NR type (RedCap, eRedCap, 2Rx XR) and should hence, based on this knowledge, further avoid (up to NW solution) the handover of such UE to a target gNB not supporting the capability to serve this UE.

**Q1: Please share your view whether this scenario is valid:**

|  |  |  |
| --- | --- | --- |
| **Company** | **Y/N** | **Comment** |
| Ericsson | Yes | Yes, there is a gap between st2 and st3. The knowledge is lacking |
| Nokia | Yes and No | There is no standards support for an eNB to determine the 5G radio redcap capability of the UE (therefore the “if possible” hinting at implementation means). |
| CATT | Yes | One of the implementation is to allow eNB decode NR radio capability. Base on this, the source eNB may know that target node does not the same capability as UE via new or old cause value, and “learn” from it for following handover. But the implementation may also support configuring the neighbor gNB capability to eNB e.g., via OAM. In this case, cause value may be not needed. |
| Huawei | Yes for the scenario, No for the interpretation | When RAN2 made such agreements, they did not intend to bring any RAN3 impact. Otherwise, they should send LS to RAN3 to consider. So the above agreements can be applicable to legacy eNBs. Then this can be left to OAM configuration (as indicated from CATT), or the implementation details as indicated by Nok (without any standard work).  |
| China Telecom | yes | eNB can be upgraded to support decode the NR UE capability via implementation. With this knowledge, the source eNB needs to know whether the target NR node support RedCap or eRedcap…Since this scenario on inter-RAT handover failure had been found in our network, we need this solution to address our issue.  |
| BT | Yes  | This is a real network scenario; an operator may choose not to enable Redcap on all carriers/cells within a gNB due to commercial or technical reasons. Or some gNBs may not be upgraded to support Redcap. Ideally, we would like to stop all Redcap devices from attempting handovers from eNB to non-supporting RedCap cells, by the implementation solution suggested. As a minimum the Redcap device should not reattempt to the same non-support RedCap target cell. |
| ZTE | Yes | Agree with E/// |

**Summary**

**Source eNB implementation can avoid HO attempts of RedCap/eRedCap/2RxXR UE to target gNB not supporting such UE on cell level.**

## Cause values

Based on the online and offline discussions, below a summary of the cause values that have been mentioned proposed to address this use case

|  |  |  |
| --- | --- | --- |
| **Cause value** | **Pros** | **Cons** |
| Radio resources not available | No impacts to S1AP | This is not about RRM (where radio resources may be only temporarily limited) but about permanent non availability. |
| Insufficient UE capabilities | No impact to S1AP  | **This cause is half correct**: A RedCap UE has indeed “insufficient UE capabilities” to operate in a gNB which can only handle regular UEs. However, if gNB does not support RedCap (does not transmit the support in SIB), how can we interpret that UE has insufficient capabilities? Also, this is not about insufficient UE caps, this is about insufficient cell caps. |
| Insufficient RAN capabilities | Source eNB clearly knows that HO is not possible towards that target. | Impact on S1AP |
| Handover Target not allowed | No impact to S1AP  | “not allowed” is not appropriate, the case being discussed is that the HO is permanently “not possible”. |

**Potential proposals:**

**Q2: based on discussion two options are proposed:**

 **Opt 1: agree S1AP CRs R3-244403 and R3-244404 by E/// et al.**

**Opt 2: agree online that cv “Handover Target not allowed” also means “HO is not possible”**

|  |  |  |
| --- | --- | --- |
| **Company** | **Opt1 or 2** | **Comment** |
| Ericsson | 1 | Opt 1 is preferred due to its clarity |
| Nokia | 2  | Option 1 does not help and can even be harmful as was explained during the online discussion. Existing cause values already exist to prevent the source eNB to attempt again the handover to this target cell for this UE such as “handover target not allowed” but usage of cause values should not be exclusive. |
| CATT |  | We do not expect to do much in specification if RAN2 decides to base on eNB implementation. We cannot assuming OAM can do or cannot do i.e., OAM configures the neighbour gNB capability to Enb. It is difficult to define a solution in order to **help eNB’s implementation**. |
| Huawei | 2 or Insufficient UE capabilities (both without spec impact) | We generally share the view from Nokia. About the “Insufficient UE capabilities”, it was discussed in R3-210409, where the MeNB can not decode the NR capabilities, then the en-gNB has to reject the addition request due to no support of the e.g., “BW or spectrum sharing capabilities the UE supports”. So we think this can also be reused for inter-system S1 handover when the source eNB can not decode the NR capability, but the target gNB has to reject it due to no support of (e)RedCap/2 Rx XR. Another possibility is to reuse the “Handover Target not allowed”. So we don’t mandate which exact value can be used for which case in our spec.  |
| China Telecom | 1 | We prefer Option 1 as this common cause value is the best choice for the future new features which will be introduced in specifications. As we know, there are two cases for redcap not support in the target NR node as following:1. the target node is not upgraded to support Rel-17 Redcap
2. The target node support Rel-17 RedCap functionality but access indications, e.g., cellBarredRedCap-r17,intraFreqReselectionRedCap-r17 in SIB1 is set to false based on operator’s configuration.

The existing cause value “Insufficient UE capabilities” and “Handover Target not allowed” can not be used to indicate the actual reason why the handover failure. We understand the existing cause value are not applicable for this scenario. |
| BT | 2, maybe | If feasible, we prefer not to introduce a new cause code and reuse existing cause values. Question: what is the expected behaviour if the eNB receives ‘handover target not allowed’, should eNB retry the handover with the same UE/same target cell?OAM is not feasible solution in a multi-vendor scenarios. |
| ZTE | 1 | We share the same view as CT, we cannot agree with opt 2 |

**Summary**

**No consensus on introducing new cause value or adding new interpretation to existing cause value in S1AP spec.**

# TBD