**3GPP TSG-SA5 Meeting #158 *S5-247197***

**Orlando, USA, 18 – 22 November 2024**

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| *CR-Form-v12.2* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
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|  | **28.552** | **CR** | **0608** | **rev** | **1** | **Current version:** | **19.1.0** |  |
|  | | | | | | | | |
| *For* [***HELP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* | | | | | | | | |
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| ***Proposed change affects:*** | UICC apps |  | ME |  | Radio Access Network | **X** | Core Network | **X** |

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| ***Title:*** | Rel-19 CR TS 28.552 New measurements to monitor Sub-Optimal Handovers (Intra-5GS and Inter-System) | | | | | | | | | |
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| ***Source to WG:*** | Nokia, Ericsson | | | | | | | | | |
| ***Source to TSG:*** | S5 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | PM\_KPI\_5G\_Ph4 | | | | |  | ***Date:*** | | | 2024-10-04 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **B** |  | | | | | ***Release:*** | | | Rel-19 |
|  | *Use one of the following categories:* ***F*** *(correction)* ***A*** *(mirror corresponding to a change in an earlier release)* ***B*** *(addition of feature),* ***C*** *(functional modification of feature)* ***D*** *(editorial modification)*  Detailed explanations of the above categories can be found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | | | | | | | | *Use one of the following releases: Rel-8 (Release 8) Rel-9 (Release 9) Rel-10 (Release 10) Rel-11 (Release 11) … Rel-16 (Release 16) Rel-17 (Release 17) Rel-18 (Release 18) Rel-19 (Release 19)* | |
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| ***Reason for change:*** | | Monitoring functionality by means counters has previously been added for the Handover failure cases; however, there are no counters defined for the near-failure or sub-optimal success handover cases. Without these measurements, these sub-optimal handover scenarios cannot be statiscally characterized and hence, the operator may not be able to take corrective actions to prevent or reduce these scenarios. In this CR, we propose 6 counters to take care of this major gap. | | | | | | | | |
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| ***Summary of change:*** | | 6 new measurements are proposed  - Almost Too Early Handovers (Intra-5GS and Inter-System)  - Almost Too Late Handovers (Intra-5GS and Inter-System)  - RLF After Successful Handovers (Intra-5GS and Inter-System) | | | | | | | | |
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| ***Consequences if not approved:*** | | Operators will be able to measure, analyze and take corrective actions in scenarios where handovers succeed, but not at the optimum level. This covers both Intra-5GS NR handovers as well as Inter-System handovers/ | | | | | | | | |
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| ***Clauses affected:*** | | 5.1.1.6.x (new), 5.1.1.6.y (new), A.66 | | | | | | | | |
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|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  | **X** | Other core specifications | | | | TS/TR ... CR ... | | |
| ***affected:*** | |  | **X** | Test specifications | | | | TS/TR ... CR ... | | |
| ***(show related CRs)*** | |  | **X** | O&M Specifications | | | | TS/TR ... CR ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
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| ***This CR's revision history:*** | | S5-247197 is a revision of S5-245521 | | | | | | | | |

***Start of First change***

##### 5.1.1.6.x Handover near failures related to MRO for intra-system mobility

a) This measurement provides the number of handover near failure events related to MRO detected during the intra-system mobility within 5GS, see TS 38.300 [49] clause 15.5.2.7. The measurements include separate counters for different handover near failure types, classified as Intra-system almost too early handover, Intra-system almost too late handover and Near failure event followed by RLF Report.

b) CC.

c) The measurements of intra-system almost too early handover, almost too late handover and near failure handover followed by radio link failure are obtained respectively by accumulating the number of failure events detected by gNB during the intra-system mobility within 5GS. The events are obtained internally within the gNB or by the reception of SHR, and in the case of NearFailureRLF also the RLF Report. Measurements are collected on the node supporting the source node of the handover.

d) Each measurement is an integer value.

e) HO.IntraSys.AlmostTooEarly  
HO.IntraSys.AlmostTooLate

HO.IntraSys.NearFailureRLF

f) NRCellCU

NRCellRelation

g) Valid for packet switched traffic.

h) 5GS.

i) One usage of this measurement is to support MRO (see TS 28.313 [30]).

##### 5.1.1.6.y Handover near failures related to MRO for inter-system mobility

a) This measurement provides the number of handover failure events related to MRO detected during successful inter-system mobility between NG-RAN and E-UTRAN, limited to the scenarios defined in TS 38.300 [49] clause 15.5.2.7. The measurements include separate counters for different handover near failure types, classified as Inter-system almost too early handover (inter-system mobility from E-UTRAN to NG-RAN), Inter-system almost too late handover (inter-system mobility from NG-RAN to E-UTRAN) and Near failure event followed by RLF Report.

b) CC.

c) The measurements of almost too early inter-system handovers events are obtained by accumulating the number of near failure events detected during the inter-system mobility from E-UTRAN to NG-RAN. The measurements of almost too late inter-system handover events are obtained by accumulating the number of almost failure events detected during the inter-system mobility from NG-RAN to E-UTRAN. The events are obtained internally within the gNB or by the reception of SHR, and in the case of NearFailureRLF also the RLF Report.

d) Each measurement is an integer value.

e) HO.InterSys.AlmostTooEarly

HO.InterSys.AlmostTooLate

HO.InterSys.NearFailureRLF

f) NRCellCU  
EutranRelation (contained by NRCellCU)

g) Valid for packet switched traffic.

h) 5GS.

i) One usage of this measurement is to support MRO (see TS 28.313 [30]).

***Start of next change***

# A.66 Monitoring of MRO performance

5G NR cells may experience issues, such as too early or too late handover, handover to wrong cell, ping-pong handover, that not only impact user experience, but also waste network resources, if handover parameters are not set properly. MRO is intended to automatically detect the handover issues, and determine actions to configure the handover parameters in cells in order to improve the handover performance.

It is also important to have information about the used beams in the source in order to optimize the handover performance taking beam IDs into account.

The MRO related measurements are used to support the mobility robustness optimization SON function as well as analytics functions.

MRO related measurements can be based on internal gNB events, signalling between nodes, as well as reports like Radio Link Failure (RLF) Report and Successful Handover Failure Report (SHR).

***End of change***