3GPP TSG-RAN WG4 Meeting # 104-e R4-2213948

Electronic Meeting, 15 August - 26 August, 2022

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| *CR-Form-v12.2* |
| **CHANGE REQUEST** |
|  |
|  | **36.133** | **CR** | **7176** | **rev** | **1** | **Current version:** | **17.6.0** |  |
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| *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 | **X** | Radio Access Network |  | Core Network |  |

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| ***Title:***  | CR on correction of fine timing for HO with PSCell when PSCell is on CCA in EN-DC to EN-DC scenario  |
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| ***Source to WG:*** | Ericsson |
| ***Source to TSG:*** | R4  |
|  |  |
| ***Work item code:*** | NR\_RRM\_enh2-Core |  | ***Date:*** | 2022-08-26 |
|  |  |  |  |  |
| ***Category:*** | **F** |  | ***Release:*** | Rel-17 |
|  | *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 canbe 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:*** | Fine timing requirement for HO with PSCell for NR-U is not correct.  |
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| ***Summary of change:*** | Correction of fine timing requirement for NR PSCell with CCA carrier |
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| ***Consequences if not approved:*** | The requirements for HO with PSCell for NR-U are not correct. |
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| ***Clauses affected:*** | 5.9 |
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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 ...  |
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| ***Other comments:*** |  |
|  |  |
| ***This CR's revision history:*** | R4-2213948 |

### <Start of Change 1>

5.9 EN-DC Handover with PSCell using CCA

5.9.1 Introduction

When the UE receives a RRC message implying handover with PSCell change, the UE shall be ready to start the transmission of the new uplink PRACH channel on target E-UTRA PCell within DHOwithPSCell\_PCell ms from the end of the last TTI containing the RRC command, and UE shall be ready to start the transmission of the new uplink PRACH channel on a target PSCell on a carrier frequency with CCA within DHOwithPSCell\_PSCell seconds and from the end of the last TTI containing the RRC command.

Where:

* DHOwithPSCell\_PCell equals the maximum RRC procedure delay defined in clause 11.2 in TS 36.331 [2] plus the interruption time stated in clause 5.9.1.1.
* DHOwithPSCell\_PSCell is the PSCell addition delay stated in clause 5.9.1.2.

5.9.1.1 Handover with PSCell – E-UTRA HO Interruption time

The interruption time is the time between end of the last TTI containing the RRC command on the old PDSCH and the time the UE starts transmission of the new PRACH excluding the RRC procedure delay. This requirement applies when UE is not required to perform any synchronisation procedure before transmitting on the new PRACH or on the new PUSCH.

When Handover with PSCell is commanded, the interruption time shall be less than Tinterrupt

 Tinterrupt = Tsearch + TIU + Tprocessing ms

Where:

Tsearch is same as the Tsearch defined in section 5.1.2.1.2

TIU is same as the one defined in section 5.1.2.1.2.

Tprocessing is the SW processing time needed by UE, including RF warm up period. Tprocessing­­­ = 25 ms.

NOTE: The actual value of TIU shall depend upon the PRACH configuration used in the target E-UTRA cell.

In the interruption requirement, a cell is known if it has been meeting the relevant cell identification requirement during the last 5 seconds. Otherwise, it is unknown. Relevant cell identification requirements are described in Clause 8.1.2.2.1 for intra-frequency handover and Clause 8.1.2.3.1 for inter-frequency handover.

5.9.1.2 Handover with PSCell - NR PSCell Change Delay requirements

When Handover with PSCell is commanded, the NR PSCell on a carrier frequency with CCA changing delay shall be less than DHOwithPSCell\_PSCell:

DHOwithPSCell\_PSCell = TRRC\_delay + Tprocessing + Tsearch + T∆ + TIU\_PSCell + 2 ms

Where:

 TRRC\_delay is maximum RRC procedure delay to be defined in clause 11.2 in TS 36.331 [2].

Tsearch is the time required to search the target cell when the target cell is not already known when the handover command is received by the UE. If the target cell is known, then Tsearch = 0 ms. If the target cell is an unknown cell and target cell Es/Iot ≥ [-2] dB, then Tsearch = (3+L1) \*Trs ms. Regardless of whether DRX is in use by the UE, Tsearch shall still be based on non-DRX target cell search times.

L1 is the number of SMTC occasions not available at the UE during the inter-RAT detection period. Regardless of whether DRX is in use by the UE, Tsearch shall still be based on non-DRX target cell search times.

 T∆ is time for fine time tracking and acquiring full timing information of the target cell. T∆ = (1+ L2) \*Trs ms for a known or an unknown PSCell, where L2 is the number of SMTC occasions not available at the UE during the time tracking period.

Tprocessing is time for UE processing. Tprocessing can be up to 25 ms.

Tmargin is time for SSB post-processing. Tmargin can be up to 2 ms.

 TIU\_PSCell is the delay uncertainty due to the random-access procedure when sending PRACH to the new cell. TIU\_PSCell can be up to: (1+ L3) \*TSSB,RO + 10 ms; where TSSB,RO is the SSB to PRACH occasion association period as defined in Table 8.1-1 of TS 38.213 [39] and L3 is the number of consecutive SSB to PRACH occasion association periods during which no PRACH occasion is available for PRACH transmission due to UL CCA failures [and RACH collision between PCell and PSCell]. L3 = 0 for Type 2C UL channel access procedure as defined in TS 37.213 [57].When the UE is configured with both the UL BWP with PRACH occasion on the target cell and UL LBT failure detection/recovery, the interruption can be longer.

NOTE 1: The actual value of TIU\_PSCell shall depend upon the PRACH configuration used in the target cell.

NOTE 2: The interruption time extended by L1, L2and L3 parameters, and by the UL LBT failure detection/recovery mechanism is limited by the T304 timer. The UE behaviour at the T304 timer expiry is specified in TS 38.331 [38].

 Trs is the SMTC periodicity of the target NR cell if target NR PSCell is unknown and SMTC configuration of target unknown NR PSCell is present in *RRCConnectionReconfiguration*, otherwise Trs is the SMTC configured in the measObjectNR having the same SSB frequency and subcarrier spacing. If the measObjectNRs having the same SSB frequency and subcarrier spacing configured by MN and SN have different SMTC, Trs is the periodicity of one of the SMTC which is up to UE implementation. If the UE is not provided SMTC configuration or measurement object on this frequency, the requirement in this section is applied with Trs = 5 ms assuming the SSB transmission periodicity is 5 ms. There is no requirement if the SSB transmission periodicity is not 5 ms.

A cell on a carrier frequency with CCA is known if it has been meeting the relevant cell identification requirement during the last 5 seconds. Otherwise, it is unknown. Relevant cell identification requirements are described in clause 8.1.2.4.21A, and 8.1.2.4.22A.

### <End of Change 1>