**3GPP TSG-RAN2 Meeting #117 electronic *R2-220xxxx***

**Online, 21 Feb – 03 Mar, 2022**

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| *CR-Form-v12.2* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
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|  | **37.340** | **CR** | **0294** | **rev** | **1** | **Current version:** | **16.8.0** |  |
|  | | | | | | | | |
| *For* [***HE******LP***](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 | **X** | Core Network |  |

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| ***Title:*** | Introducing support of UP IP for EPC connected architectures using NR PDCP | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Huawei, HiSilicon, Vodafone, Ericsson | | | | | | | | | |
| ***Source to TSG:*** | RAN2 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | UPIP\_EN-DC\_UE | | | | |  | ***Date:*** | | | 2022-02-xx |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **B** |  | | | | | ***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 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)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | In RP #94 meeting, User Plane Integrity Protection for EPC connected architectures using NR PDCP (i.e. UP IP applies to EN-DC capable UEs) was agreed to be supported in Rel-17 as in RP-213669. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | * Add TS 24.301 in list of references * In clause 9, adding descriptions that UP IP can be activated for the UEs in EN-DC if supported. | | | | | | | | |
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| ***Consequences if not approved:*** | | UP IP can not be supported for LTE/EPC. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 2, 9 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | | **X** |  | Other core specifications | | | | TS 36.331 CR #4763,  TS 38.331 CR #2904,  TS 36.300 CR #1353,  TS 38.323 CR #0085 | | |
| ***affected:*** | |  | **X** | Test specifications | | | | TS/TR ... CR ... | | |
| ***(show related CRs)*** | |  | **X** | O&M Specifications | | | | TS/TR ... CR ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

# 2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non‑specific.

- For a specific reference, subsequent revisions do not apply.

- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

[1] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".

[2] 3GPP TS 36.300: "Evolved Universal Terrestrial Radio Access (E-UTRA) and Evolved Universal Terrestrial Radio Access Network (E-UTRAN); Overall description; Stage 2".

[3] 3GPP TS 38.300: "NR; NR and NG-RAN Overall description; Stage 2".

[4] 3GPP TS 38.331: "NR; Radio Resource Control (RRC) protocol specification".

[5] 3GPP TS 38.423: "NG-RAN; Xn application protocol (XnAP)".

[6] 3GPP TS 38.425: "NG-RAN; NR user plane protocol".

[7] 3GPP TS 38.401: "NG-RAN; Architecture description".

[8] 3GPP TS 38.133: "NG-RAN; Requirements for support of radio resource management".

[9] 3GPP TS 36.423: "Evolved Universal Terrestrial Radio Access Network (E-UTRAN); X2 Application Protocol (X2AP)".

[10] 3GPP TS 36.331: "Evolved Universal Terrestrial Radio Access (E-UTRA); Radio Resource Control (RRC); Protocol specification".

[11] 3GPP TS 23.501: "System Architecture for the 5G System; Stage 2".

[12] 3GPP TS 38.101-1: "User Equipment (UE) radio transmission and reception; Part 1: Range 1 Standalone".

[13] 3GPP TS 38.101-2: "User Equipment (UE) radio transmission and reception; Part 2: Range 2 Standalone".

[14] 3GPP TS 38.101-3: "User Equipment (UE) radio transmission and reception; Part 3: Range 1 and Range 2 Interworking operation with other radios".

[15] 3GPP TS 36.323: "Evolved Universal Terrestrial Radio Access (E-UTRA); Packet Data Convergence Protocol (PDCP) specification".

[16] 3GPP TS 38.323: "NR; Packet Data Convergence Protocol (PDCP) specification".

[17] 3GPP TS 38.340: "Backhaul Adaptation Protocol (BAP) specification".

[18] 3GPP TS 23.287: "Architecture enhancements for 5G System (5GS) to support Vehicle-to-Everything (V2X) services ".

[19] 3GPP TS 23.285: "Architecture enhancements for V2X services".

[20] 3GPP TS 23.502: "Procedures for the 5G System; Stage 2".

[21] 3GPP TS 38.213: "NR; Physical layer procedures".

[xx] 3GPP TS 24.301: "Non-Access-Stratum (NAS) protocol for Evolved Packet System (EPS); Stage 3".

9 Security related aspects

MR-DC can only be configured after security activation in the MN.

In EN-DC and NGEN-DC, for bearers terminated in the MN the network configures the UE with KeNB; for bearers terminated in the SN the network configures the UE with S-KgNB. In NE-DC, for bearers terminated in the MN the network configures the UE with KgNB; for bearers terminated in the SN the network configures the UE with S-KeNB. In NR-DC, for bearers terminated in the MN the network configures the UE with KgNB; for bearers terminated in the SN the network configures the UE with S-KgNB.

In NE-DC and NR-DC, a PCell change without KgNB change does not require a S-KeNB change (NE-DC case) or a S-KgNB change (NR-DC case).

In EN-DC, NGEN-DC and NR-DC, for a PSCell change that does not require a KeNB change (i.e. no simultaneous PCell handover in EN-DC and NGEN-DC) or a KgNB change (in NR-DC), S-KgNB key refresh is not required if the PDCP termination point of the SN is not changed. In NE-DC, a PSCell change always requires a S-KeNB change.

In EN-DC, the UE supports the NR security algorithms corresponding to the E-UTRA security algorithms signalled at NAS level and the UE NR AS Security capability is not signalled to the MN over RRC. Mapping from E-UTRA security algorithms to the corresponding NR security algorithms, where necessary, is performed at the MN. An EN-DC capable UE supporting user plane integrity protection when connected to E-UTRA/EPC (see TS 24.301 [xx]) shall support integrity protection for all DRBs (MN and SN terminated) at any data rate, up to and including the highest data rate supported by the UE for both UL and DL. MN and/or SN terminated DRBs can have UP integrity protection activation either on or off, on a per radio bearer basis.

For MR-DC with 5GC, UP integrity protection can be configured on a per radio bearer basis. All DRBs which belong to the same PDU session always have the same UP integrity protection activation, i.e., either on or off:

- For NR-DC: MN and/or SN terminated DRBs of a PDU session can have UP integrity protection activation either on or off. A UE configured to operate in NR-DC shall support integrity protection for all DRBs (MN and SN terminated) at any data rate, up to and including the highest data rate supported by the UE for both UL and DL (see TS 38.300 [3]).

- For NE-DC: MN terminated DRBs of a PDU session can have UP integrity protection activation on; however, in this case, the MN will not at any point offload any DRB of such PDU session to the SN. A UE configured to operate in NE-DC shall support integrity protection for all MN terminated DRBs at any data rate, up to and including the highest data rate supported by the UE's radio access capabilities for both UL and DL (see TS 38.300 [3]). SN terminated DRBs of a PDU session always have UP integrity protection activation off.

- For NGEN-DC: Both MN terminated and SN terminated DRBs of a PDU session always have UP integrity protection activation off.