**3GPP TSG-SA3 Meeting #108-e *S3-222097-r1***

**e-meeting, 22nd - 26th August 2022** *Revision of S3-22xxxx*

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| *CR-Form-v12.1* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
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|  | **33.501** | **CR** | **0712** | **rev** | **-** | **Current version:** | **17.6.0** |  |
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| *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 |  | Radio Access Network | **X** | Core Network | **X** |

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| ***Title:*** | Address UPIP forward compatibility issue | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Huawei, HiSilicon | | | | | | | | | |
| ***Source to TSG:*** | S3 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | UPIP\_SEC\_LTE | | | | |  | ***Date:*** | | | 2022-08-15 |
|  |  | | | |  | |  | | |  |
| ***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 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-15 (Release 15) Rel-16 (Release 16) Rel-17 (Release 17) Rel-18 (Release 18)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | TS 36.413 and TS 36.423 have made UP integrity protection policy (i.e. security indication) as “reject IE”, which means that if the legacy eNB cannot comprehend the new IE in the request message, the whole request message will be rejected, which may cause DoS issue.  In order to make the forward capability issue goes smoothly, it is proposed that source eNB/MME/MeNB can learn the target eNB/SgNB capability if the rejection happens. In case that the UP integrity policy is “preferred” or “not needed”, the source eNB/MME/MeNB can select the unsupported target eNB/SgNB, but shall not provide UP integrity protection policy, because it may cause efficiency issue. If the UP integrity policy is “required”, the source eNB/MME/MeNB shall not select that target eNB/SgNB, and may select the eNB/SgNB who supports UP integrity protection feature instead.  In addition, there are some typo. | | | | | | | | |
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| ***Summary of change:*** | | Editorial change on NOTE.  Add text to clarifiy action on the source eNB/MME/MeNB if the target eNB cannot comprehend UP IP policy IE. | | | | | | | | |
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| ***Consequences if not approved:*** | | The forward compatibility issue may happen which may impact UE’s service continuity | | | | | | | | |
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| ***Clauses affected:*** | | 7.3.3 | | | | | | | | |
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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:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\* Start of 1st Change \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

7.3.3 UP integrity protection policy

NOTE 1: Only EN-DC capable UEs and EN-DC capable eNBs support UP integrity protection. Therefore, the eNB can only activate UP integrity protection with a UE that is EN-DC capable and supports user plane integrity protection with EPS.

If the UE indicates that it supports user plane integrity protection with EPS in EIA7 in the EPS security capability, the MME shall provide UP integrity protection policy for each E-RAB to the eNB during the Attach/Dedicated bearer activation/Dedicated bearer modification procedure as specified in TS 23.401 [2]. The MME receives UP integrity protection policy from SMF+PGW-C via SGW.

NOTE 2: The SMF+PGW-C can be locally configured with UP integrity protection and confidentiality policy. However, the SMF+PGW-C only sends UP integrity protection policy to the upgraded SGW. The SMF+PGW-C, SGW and MME can use GTP-C signalling compatibility concepts to jugde whether to send UP integrity protection policy to the peer.

The UP integrity protection policy shall indicate whether UP integrity protection shall be activated or not for all DRBs belonging to that E-RAB.

The eNB shall be locally configured with UP integrity protection policy. If the eNB receives UP integrity protection policy from the MME, the eNB shall use the received UP integrity protection policy, otherwise, the eNB shall use the locally configured UP integrity protection policy if EIA7 in the EPS security capability indicates that the UE supports user plane integrity protection with EPC.

The locally configured UP integrity protection policy on eNB should be set as "preferred".

The eNB shall activate UP integrity protection per each DRB, according to the UP integrity protection policy, using RRC signalling as defined in clause 7.3.4. If the UP integrity protection policy indicates "Required", the eNB shall activate UP integrity protection. If the eNB cannot activate UP integrity protection, and when the UP integrity protection policy is "Required", the eNB shall reject establishment of UP resources for the E-RAB and indicate reject-cause to the MME. If the UP integrity protection policy is " Not needed ", the eNB shall not activate UP integrity protection.

At an X2-handover from the source eNB to the target eNB, the source eNB shall include in the HANDOVER REQUEST message, the UP integrity protection policy, the UE EPS security capability and the corresponding E-RAB ID, if the UP integrity protection policy is received from other entities. If the target eNB does not receive the UP integrity protection policy, but the EIA7 in the EPS security capability indicates that the UE supports user plane integrity protection with EPC, the target eNB shall use its locally configured UP integrity protection policy to activate or deactivate the UP integrity protection for all DRBs belonging to the E-RAB.

If the received UP integrity protection policy is 'Required', the target eNB shall reject all E-RABs for which it cannot comply with the corresponding UP integrity protection policy and indicate the reject-cause to the MME. For the accepted E-RABs, the target eNB shall activate UP integrity protection per DRB according to the UP integrity protection policy and shall indicate that to the UE in the HANDOVER COMMAND by the source eNB.

If the UE receives an indication in the HANDOVER COMMAND that UP integrity protection for an E-RAB is enabled at the target eNB, the UE shall generate or update the UP integrity protection key and shall activate UP integrity protection for the respective E-RAB.

NOTE 3: If the UP integrity protection policy is 'Preferred', it is possible to have a change in activation or deactivation of UP integrity after the handover.

Further, in the Path-Switch message, the target eNB shall send the UE's UP integrity protection policy and corresponding E-RAB ID to the MME. The sent UP integrity protection policy can either be the one received from source eNB or the locally configured one if the target eNB does not receive it from the source eNB, but the EIA7 in the EPS security capability indicates that the UE supports user plane integrity protection with EPC. If the MME receives UP integrity protection policy, the MME shall verify that the UP integrity protection policy received from the target eNB is the same as the UP integrity protection policy that the MME has locally stored. If there is a mismatch, the MME shall send its locally stored UE's UP integrity protection policy of the corresponding E-RABs to the target eNB. This UP integrity protection policy, if included by the MME, is delivered to the target eNB in the Path-Switch Acknowledge message. The MME may support logging capabilities for this event and may take additional measures, such as raising an alarm.

NOTE 4: An upgraded target eNB may not receive UE's UP integrity protection policy from a legacy source eNB, thus, mismatch of UP integrity protection policy may not be regarded as an abnormal case. The upgraded target eNB can get UE's UP integrity protection policy from the MME.

If the target eNB receives UE's UP integrity protection policy from the MME in the Path-Switch Acknowledge message, the target eNB shall update the UE's UP integrity protection policy with the received UE's UP integrity protection policy. If UE's current UP integrity protection activation is different from the determination of received UE's UP integrity protection policy, then the target eNB shall initiate intra-cell handover procedure which includes RRC Connection Reconfiguration procedure to reconfigure the DRBs to activate or de-activate the UP integrity as per the received policy from MME.

At an S1-handover, the source MME shall send the UE's UP integrity protection policy and the UE EPS security capability to the target eNB via the target MME. Besides, the source eNB shall also send the UE's UP integrity protection policy if received from the source MME to the target eNB in a source-to-target container. The target eNB shall use the UE capability indicating support of UP IP in EPS together with the UP integrity protection policy received from the MME and ignore the UP integrity protection received in the source-to-target container. If the target eNB does not receive the UP integrity protection policy from the MME, the target eNB shall use the UE capability indicating support of UP IP in EPS together with the UP integrity protection policy received from the source eNB. If both policies from MME and source eNB are absent, but EIA7 in the EPS security capability indicates that the UE supports use of user plane protection with EPC, the eNB shall use locally configured UP integrity protection policy. The target eNB shall reject all E-RABs for which it cannot comply with the corresponding UP integrity protection policy and indicate the reject-cause to the source MME via the target MME. For all other E-RABs, the target eNB shall activate UP integrity protection per DRB according to the used UP integrity protection policy. If the target MME detects in a TAU procedure following S1-handover, and becomes aware of that there is a mismatch between the UE EPS security capabilities received from the source MME and the one received from the UE, and that the target eNB may not have the UE capability indicating UP IP support in UE EPS security capabilities, then the MME shall send an S1 CONTEXT MODIFICATION REQUEST message to inform the eNB about the correct UE EPS security capabilities and the target eNB shall take the new UE EPS security capabilities into account.

At interworking-handover from 5GS to EPS, the SMF+PGW-C provides the UE's UP integrity protection policy to the target eNB via the target MME. The target eNB shall determine from the UP integrity protection policy received from the SMF+PGW-C via the MME together with indication that the UE supports use of user plane protection with EPC whether to activate user plane integrity protection with the UE or not. If the target eNB does not receive the UP integrity protection policy from the SMF+PGW-C via the MME, but the UE indicates support of UP integrity protection with EPS , the eNB shall use locally configured UP integrity protection policy. The target eNB shall reject all E-RABs for which it cannot comply with the corresponding UP integrity protection policy and indicate the reject-cause to the source AMF via the target MME. For all other E-RABs, the target eNB shall activate UP integrity protection per DRB according to the used UP integrity protection policy.

In all cases for UP integrity protection policy transmission between MME and/or eNB on a single RAN interface, e.g., initial context setup, E-RAN setup, X2-handover, RRC Reestablishment, S1 handover, interworking-handover from 5GS to EPS, and EN-DC, if the receiving node does not comprehend the UP integrity protection policy IE (IE criticality set to “reject”) in the request message, it rejects the request message as specified in clause 10 in TS 36.413 [42]. The initiating node takes this lack of support into account when deciding on further actions towards the initiating node as follows: for the current procedure, if the UP integrity protection policy is set to “preferred” or “not needed” for one or more bearers, the initiating node may re-try the same procedure towards the same receiving node for such bearers only, while omitting the UP integrity protection policy in the request, and for future procedures, it may also omit the policy in the same conditions at the first attempt. Otherwise, the initiating node should not select the same receiving node and may, if appropriate, select another node that supports UP integrity protection feature instead.

At an S1 handover, if the source eNB sent the UE's UP integrity protection policy to the target eNB in a source-to-target container, and the target eNB does not indicate the security result in the target-to-source container in the reply message as described in TS 36.413 [42], the source eNB should infer that the feature is not supported at the target, and if the UP integrity protection policy is set to “required” for one or more bearers, the source eNB shall cancel the handover. The source eNB may then re-initiate the handover omitting any such bearers, and should not initiate future handover to the same target eNB with any bearers with the policy set to “required”. The source eNB may instead select another target eNB in such cases.

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\* End of 1st Change \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*