**3GPP TSG-SA3 Meeting #103-e S3-211882-r2**

**e-meeting, 17 – 28 May 2021**

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| *CR-Form-v12.0* |
| **CHANGE REQUEST** |
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|  | **33.536** | **CR** | 0025 | **rev** | **1** | **Current version:** | **16.3.0** |  |
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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 | **x** | Radio Access Network |  | Core Network |  |

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| ***Title:***  | Clarification on a figure and the key activation |
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| ***Source to WG:*** | Huawei, Hisilicon, InterDigital |
| ***Source to TSG:*** | S3 |
|  |  |
| ***Work item code:*** | eV2XARC |  | ***Date:*** | 2021-04-19 |
|  |  |  |  |  |
| ***Category:*** | **F** |  | ***Release:*** | Rel-16 |
|  | *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-15 (Release 15)Rel-16 (Release 16)Rel-17 (Release 17)Rel-18 (Release 18)* |
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| ***Reason for change:*** | The figure 5.3.3.1.4.3-1 was wrongly removed, and should be added back.It is specified that the confidentiality key, NRPEK, shall be derived in this step if and only if signalling confidentiality protection is activated for this connection in TS 33.536. However, when to generate the NRPIK is not described. It is suggest to define the integrity protection key activation similar with the NRPEK. |
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| ***Summary of change:*** | Add the figure 5.3.3.1.4.3-1 back.Add the clarification on the integrity protection key activation. |
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| ***Consequences if not approved:*** | The figure is missed.Integrity protection key activation is not clear. |
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| ***Clauses affected:*** | 5.3.3.1.4.3 |
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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 ...  |
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| ***Other comments:*** |  |
|  |  |
| ***This CR's revision history:*** |  |

\* \* \* First Change \* \* \* \*

5.3.3.1.4.3 Security establishment during connection set-up

The clause describes how security is established during connection set-up. The signalling flow is shown in figure 5.3.3.1.4.3-1.



Figure 5.3.3.1.4.3-1: Security establishment at connection set-up

1. UE\_1 has sent a Direct Communication Request to UE\_2. This message shall include UE\_1's security capabilities (the list of algorithms that UE\_1 will accept for this connection) and UE\_1's signalling security policy. The UE\_1 shall also include Nonce\_1 (for session key KNRP-sess generation), and the most significant 8-bits of the KNRP-sess ID in this message if UE\_1's signalling integrity protection policy is either "REQUIRED" or "PREFERRED". The most significant 8-bits of the KNRP-sess ID shall be chosen such that UE\_1 will be able to locally identify a security context that is created by this procedure using the KNRP-sess ID. The message may also include a KNRP ID if the UE\_1 has an existing KNRP for the UE that it is trying to communicate with. The absence of the KNRP ID parameter indicates that UE\_1 does not have a KNRP for UE\_2. The message also contains Key\_Est\_Info (see clause 5.3.3.1.3.2).

2. UE\_2 shall reject the Direct Communication Request if UE\_1's signalling security policy is "NOT NEEDED" while UE\_2's security policy is "REQUIRED". UE\_2 shall also reject the Direct Communication Request if UE\_1's signalling security policy is "REQUIRED" while UE\_2's security policy is "NOT NEEDED". UE\_2 may initiate a Direct Auth and Key Establish procedure with UE\_1. This is mandatory if the UE\_2 does not have the KNRP and KNRP ID pair indicated in step 1, and signalling is needed to establish the keys for the particular use case.

3. UE\_2 shall send the Direct Security Mode Command message to UE\_1. This message shall only contain the MSB of KNRP ID unless the Null integrity algorithm is selected by UE\_2 and optionally Key\_Est\_Info if a fresh KNRP is to be generated (see clause 5.3.3.1.3). UE\_2 shall include the Chosen\_algs parameter to include the selected integrity and confidentiality algorithm. Non-Null security algorithm in the Chosen\_algs indicates the corresponding security protection is activated and the security algorithm the UEs will use to protect the data in the message. Null security algorithm in the Chosen\_algs indicates the corresponding security protection is unprotected. The Chosen\_algs may only indicate the use of the NULL integrity algorithm if UE\_2's signalling integrity security policy is either NOT NEEDED or PREFERRED. UE\_2 shall also return the UE\_1's security capabilities and UE\_1's signalling security policy to provide protection against bidding down attacks. In the case that the NULL integrity algorithm is chosen, the NULL confidentiality algorithm shall also be chosen and UE\_2 shall set the KNRP-sess ID of this security context to the all zero value.

 The following procedures in step 3 shall only be executed if the UE\_2 decides to at least activate the integrity security protection for this connection: UE\_2 shall also include Nonce\_2 to allow a session key to be calculated, as well as the least significant 8-bits of KNRP-sess ID in the messages. These bits are chosen so that UE\_2 will be able to locally identify a security context that is created by this procedure. UE\_2 shall calculate KNRP-Sess from KNRP and both Nonce\_1 and Nonce\_2 (see clause A.3) and then derive the confidentiality (if applicable) and integrity keys based on the chosen algorithms (clause A.2). The lower layer shall be provided with the new security context and indication(s) to signal that the Direct Security Mode Command message needs integrity protection with new security context and the signalling messages can be received using the new security context. The confidentiality key, NRPEK, shall be derived in this step if and only if signalling confidentiality protection is activated for this connection. The integrity protection key, NRPIK, shall be derived in this step if and only if signalling integrity protection is activated for this connection.UE\_2 shall integrity protect the Direct Security Mode Command before sending it to UE\_1. UE\_2 is then ready to receive signalling and messages protected with the new security context. UE\_2 shall form the KNRP-sess ID from the most significant bits it received in step1 and least significant bits it sent in step3.

4. On receiving the Direct Security Mode Command, the UE\_1 shall first check the Chosen\_algs and shall accept the NULL integrity algorithm only if its security policy for signalling integrity protection is either NOT NEEDED or PREFERRED. Then UE\_1 shall check the returned UE\_1's security capabilities and UE\_1's signalling security to avoid bidding down attacks if NULL integrity algorithm is selected for signalling integrity protection. If the above check passes, UE\_1 shall send unprotected Direct Security Mode Complete message to UE\_2. UE\_1 shall set the KNRP-sess ID of this security context to the all zero value.

 Under the condition of non-NULL integrity algorithm indicated in the Chosen\_algs, UE\_1 shall first check that the received LSB of KNRP-sess ID is unique by checking that it has not been sent by another UE responding to this Direct Communication Request i.e. such that resulting KNRP-sess ID is not already being used for another link. If the LSB of KNRP-sess ID is not unique, then UE\_1 shall respond with a Direct Security Mode Reject message including a cause value to specify that the LSB of KNRP-sess ID is not unique. The peer UE-2 receiving a Direct Security Mode Reject message shall inspect the cause value and, if the cause is related to the session identifier uniqueness then, the UE-2 shall generate a new LSB of KNRP-sess ID and reply to UE-1 again (i.e., UE-2 shall send a Direct Security Mode Command message with the new LSB of KNRP-sess ID). UE\_2 shall associate the new LSB of KNRP-sess ID with the security context that is created in step 3. UE-2 shall erase the former LSB of KNRP-sess ID from its memory. On receiving this new Direct Security Mode Command, UE\_1 shall process the message from the start of step 4.

 If the LSB of KNRP-sess ID is unique, UE\_1 shall calculate KNRP-sess and the confidentiality key (if applicable) and integrity key in the same way as UE\_2. The confidentiality key, NRPEK, shall be derived in this step if and only if the Chosen\_algs includes non-NULL confidentiality algorithm. UE\_1 shall check that the returned UE\_1 security capabilities and UE\_1's signalling security policy are the same as those it sent in step 1. UE\_1 shall also check the integrity protection on the message. If both these checks pass, then UE\_1 creates a security context to be associated with the KNRP-sess ID. UE\_1 is ready to send and receive signalling and message with the new security context. The lower layer shall be provided with the new security context and indication to signal that signalling starting with the the Direct Security Mode Complete needs protection with new security context and the signalling messages can be received using the new security context. UE\_1 shall send integrity protected and confidentiality protected (if applicable) Direct Security Mode Complete message to UE\_2. UE\_1 shall form the KNRP-sess ID from the most significant bits it sent in step1 and least significant bits it received in step3. KNRP-sess ID is used to locally identify the security context that is created by this procedure.

5. If the Chosen\_algs in step 3 includes non-NULL integrity algorithm, UE\_2 checks the integrity protection on the received Direct Security Mode Complete. If this passes, UE\_2 is now ready to send signalling message and send and receive user plane traffic protected with the new security context. UE\_2 shall send integrity protected and confidentiality (if applicable) protected Direct Communication Accept message to UE\_1 with the new security context. The lower layer shall be provided with an indication before sending Direct Communication Accept message to indicate that the signalling message starting with the Direct Communication Accept is protected with the new security context and an indication after sending Direct Communication Accept message to indicate that the user plane traffic is protected with new security context. UE\_2 deletes any old security context it has for UE\_1.

6. After receiving the Direct Communication Accept message, the lower layer of UE\_1 shall be provided with an indication of activation of the PC5 unicast user plane security protection for the PC5 unicast link (if applicable). UE\_1 is now ready to send and receive user plane traffic protected with the new security context. UE\_1 deletes any old security context it has for UE\_2.

\* \* \* End of Changes \* \* \* \*