**3GPP TSG-CT WG1 Meeting #136-eC1-22xxxx**

**E-Meeting, 12th – 20th May 2022**

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| *CR-Form-v12.1* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **24.554** | **CR** | **0100** | **rev** | **1** | **Current version:** | **17.0.0** |  |
|  | | | | | | | | |
| *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 |  | Core Network |  |

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|  | | | | | | | | | | |
| ***Title:*** | Rejecting PC5 connection establishment request upon security failure | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Nokia, Nokia Shanghai Bell, OPPO, Ericsson | | | | | | | | | |
| ***Source to TSG:*** | C1 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | 5G\_ProSe | | | | |  | ***Date:*** | | | 2022-04-28 |
|  |  | | | |  | |  | | |  |
| ***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-15 (Release 15) Rel-16 (Release 16) Rel-17 (Release 17) Rel-18 (Release 18)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | The control plane security procedure for UE-to-network relay may fail, due to e.g. failure in authenticating the Remote UE by the network (**as per the steps in figure 6.3.3.3.2-1 in TS 33.503**) or failure in selecting an AUSF (**see S2-2203591**).  Also the user plane security procedure for UE-to-network relay may fail if e.g. the Relay UE is not authorize to provide the relay service or the Remote UE is not authorized to use the relay service, **as described in step 4 in clause 6.3.3.2.2 in TS 33.503**.  In those cases, the network elements (AMF or 5G PKMF, depending on the used solution) may send a Rejection message to the Relay UE, hence the Relay UE would need to reject the PC5 connection establishment request back to the Remote UE. This requirement needs to be specified in stage-3 spec.  Moreover, a new rejection cause is needed to be provided to the Remote UE in the above situation. This would assist the Remote UE to take any proper action (e.g. reselecting another Relay UE, see S2-2203591) since the existing causes can't be used for that scenario. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | Specifying that, the Relay UE would reject the PC5 connection establishment request back to the Remote UE upon failure of the control plane security procedure or failure of the user plane security procedure, and introducing a new cause for that case. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | Incomplete specifications due to missing requirements of how both the Relay UE and the Remote UE would proceed upon failure in the control plane security procedure or failure in the user plane security procedure. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 7.2.2.5, 11.3.8 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **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:*** | |  | | | | | | | | |

\*\*\*\*\* First change \*\*\*\*\*

#### 7.2.2.5 5G ProSe direct link establishment procedure not accepted by the target UE

If the PROSE DIRECT LINK ESTABLISHMENT REQUEST message cannot be accepted, the target UE shall send a PROSE DIRECT LINK ESTABLISHMENT REJECT message. The PROSE DIRECT LINK ESTABLISHMENT REJECT message contains a PC5 signalling protocol cause IE set to one of the following cause values:

#1 direct communication to the target UE not allowed;

#3 conflict of layer-2 ID for unicast communication is detected;

#5 lack of resources for 5G ProSe direct link;

#13 congestion situation;

#14 security procedure failure of 5G ProSe UE-to-network relay; or

#111 protocol error, unspecified.

If the target UE is not allowed to accept the PROSE DIRECT LINK ESTABLISHMENT REQUEST message, e.g., based on operator policy or configuration parameters for ProSe direct communication over PC5 as specified in clause 5.2, or the target UE is acting as a layer-3 relay UE, is in non-allowed area of its serving PLMN, and the corresponding relay service code is not associated with an emergency services or high priority access as defined in clause 5.3.5 of 3GPP TS 24.501 [11], the target UE shall send a PROSE DIRECT LINK ESTABLISHMENT REJECT message containing PC5 signalling protocol cause value #1 "direct communication to the target UE not allowed".

For a received PROSE DIRECT LINK ESTABLISHMENT REQUEST message from a layer-2 ID (for unicast communication), if the target UE already has an existing link established to a UE using this layer-2 ID or is currently processing a PROSE DIRECT LINK ESTABLISHMENT REQUEST message from the same layer-2 ID, and with one of following parameters different from the existing link or the link for which the link establishment is in progress:

a) the source user info;

b) type of data (e.g., IP or non-IP); or

c) security policy,

the target UE shall send a PROSE DIRECT LINK ESTABLISHMENT REJECT message containing PC5 signalling protocol cause value #3 "conflict of layer-2 ID for unicast communication is detected".

NOTE 1: The type of data (e.g., IP or non-IP) is indicated by the optional IP address configuration IE included in the corresponding DIRECT LINK SECURITY MODE COMPLETE message, i.e., the type of data for the requested link is IP type if this IE is included, and the type of data for the requested link is non-IP if this IE is not included.

If the 5G ProSe direct link establishment fails due to the implementation-specific maximum number of established 5G ProSe direct links has been reached, or other temporary lower layer problems causing resource constraints, the target UE shall send a PROSE DIRECT LINK ESTABLISHMENT REJECT message containing PC5 signalling protocol cause value #5 "lack of resources for 5G ProSe direct link".

If the 5G ProSe direct link establishment request is for relaying and:

a) the NAS level mobility management congestion control as specified in clause 5.3.9 of TS 24.501 [11] is activated at the target UE; or

b) the target UE is under congestion;

the target UE shall send a PROSE DIRECT LINK ESTABLISHMENT REJECT message containing PC5 signalling protocol cause value #13 "congestion situation". The target UE may provide a back-off timer value to the initiating UE in the PROSE DIRECT LINK ESTABLISHMENT REJECT message. The target UE shall not accept any 5G ProSe direct link establishment request for relaying if the back-off timer for NAS level mobility management congestion control is running.

NOTE 2: How the target UE determines that it is under congestion is implementation specific (e.g., any relaying related operational overhead, etc).

NOTE 3: In case the target UE is under the NAS level mobility management congestion control, it is an implementation option that the provided back-off timer value to the initiating UE is set to the remaining time of the mobility management back-off timer T3346 or with an additional offset value.

If the 5G ProSe direct link establishment procedure is for direct communication between the 5G ProSe remote UE and the 5G ProSe UE-to-network relay UE and it fails due to a failure in the security procedure over control plane or security procedure over user plane as specified in 3GPP TS 33.503 [34], the target UE shall send a PROSE DIRECT LINK ESTABLISHMENT REJECT message containing PC5 signalling protocol cause value #14 "security procedure failure of 5G ProSe UE-to-network relay".

If the 5G ProSe direct link establishment fails due to other reasons, the target UE shall send a PROSE DIRECT LINK ESTABLISHMENT REJECT message containing PC5 signalling protocol cause value #111 "protocol error, unspecified".

After sending the PROSE DIRECT LINK ESTABLISHMENT REJECT message, the target UE shall provide the following information along with the initiating UE's layer-2 ID for unicast communication and the target UE's layer-2 ID for unicast communication to the lower layer:

a) an indication of deactivation of the PC5 unicast security protection and deletion of security context for the 5G ProSe direct link, if applicable.

Upon receipt of the PROSE DIRECT LINK ESTABLISHMENT REJECT message, the initiating UE shall stop timer T5080 and abort the 5G ProSe direct link establishment procedure. If the PC5 signalling protocol cause value in the PROSE DIRECT LINK ESTABLISHMENT REJECT message is #1 "direct communication to the target UE not allowed" or #5 "lack of resources for 5G ProSe direct link", then the initiating UE shall not attempt to start the 5G ProSe direct link establishment procedure with the same target UE at least for a time period T. If the PC5 signalling protocol cause value in the PROSE DIRECT LINK ESTABLISHMENT REJECT message is #13 "congestion situation" and a back-off timer value is provided in the PROSE DIRECT LINK ESTABLISHMENT REJECT message, the initiating UE shall start timer T5088 associated with the layer-2 ID of the target UE and set its value to the provided timer value.

NOTE 4: The length of time period T is UE implementation specific and can be different for the case when the UE receives PC5 signalling protocol cause value #1 "direct communication to the target UE not allowed" or when the UE receives PC5 signalling protocol cause value #5 "lack of resources for 5G ProSe direct link".

After receiving the PROSE DIRECT LINK ESTABLISHMENT REJECT message, the initiating UE shall provide the following information along with the initiating UE's layer-2 ID for unicast communication and the target UE's layer-2 ID for unicast communication to the lower layer:

a) an indication of deactivation of the PC5 unicast security protection and deletion of security context for the 5G ProSe direct link, if applicable.

\*\*\*\*\* Next change \*\*\*\*\*

### 11.3.8 PC5 signalling protocol cause

The purpose of the PC5 signalling protocol cause information element is to indicate the cause used in the PC5 signalling protocol procedures.

The PC5 signalling protocol cause is a type 3 information element with a length of 2 octets.

The PC5 signalling protocol cause information element is coded as shown in figure 11.3.8.1 and table 11.3.8.1.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| PC5 signalling protocol cause IEI | | | | | | | | octet 1 |
| PC5 signalling cause value | | | | | | | | octet 2 |

Figure 11.3.8.1: PC5 signalling protocol cause information element

Table 11.3.8.1: PC5 signalling protocol cause information element

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| PC5 signalling cause value (octet 2) | | | | | | | | | | | | | | | | | | | | | | | | |
|  | | | | | | | | | | | | | | | | | | | | | | | | |
| Bits | | | | | | | | | | | | | | | | | | | | | | | | |
| 8 | | 7 | | 6 | | 5 | | 4 | | 3 | | | 2 | | | 1 | | |  | | |  | | |
| 0 | | 0 | | 0 | | 0 | | 0 | | | 0 | | | 0 | | | 1 | | |  | | | Direct communication to the target UE not allowed | | |
| 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | | 1 | | | 0 | | |  | | | Direct communication to the target UE no longer needed | | |
| 0 | | 0 | | 0 | | 0 | | 0 | | | 0 | | | 1 | | | 1 | | |  | | | Conflict of layer-2 ID for unicast communication is detected | | |
| 0 | | 0 | | 0 | | 0 | | 0 | | 1 | | | 0 | | | 0 | | |  | | | Direct connection is not available anymore | | |
| 0 | | 0 | | 0 | | 0 | | 0 | | | 1 | | | 0 | | | 1 | | |  | | | Lack of resources for 5G ProSe direct link | | |
| 0 | | 0 | | 0 | | 0 | | 0 | | | 1 | | | 1 | | | 0 | | |  | | | Authentication failure | | |
| 0 | | 0 | | 0 | | 0 | | 0 | | | 1 | | | 1 | | | 1 | | |  | | | Integrity failure | | |
| 0 | | 0 | | 0 | | 0 | | 1 | | | 0 | | | 0 | | | 0 | | |  | | | UE security capabilities mismatch | | |
| 0 | | 0 | | 0 | | 0 | | 1 | | | 0 | | | 0 | | | 1 | | |  | | | LSB of KNRP-sess ID conflict | | |
| 0 | | 0 | | 0 | | 0 | | 1 | | | 0 | | | 1 | | | 0 | | |  | | | UE PC5 unicast signalling security policy mismatch | | |
| 0 | | 0 | | 0 | | 0 | | 1 | | | 0 | | | 1 | | | 1 | | |  | | | Required service not allowed | | |
| 0 | | 0 | | 0 | | 0 | | 1 | | | 1 | | | 0 | | | 0 | | |  | | | Security policy not aligned | | |
| 0 | | 0 | | 0 | | 0 | | 1 | | | 1 | | | 0 | | | 1 | | |  | | | Congestion situation | | |
| 0 | | 0 | | 0 | | 0 | | 1 | | | 1 | | | 1 | | | 0 | | |  | | | Security procedure failure of 5G ProSe UE-to-network relay | | |
|  | |  | |  | |  | |  | | |  | | |  | | |  | | |  | | |  | | |
| 0 | | 1 | | 1 | | 0 | | 1 | | | 1 | | | 1 | | | 1 | | |  | | | Protocol error, unspecified | | |
|  | |  | |  | |  | |  | | |  | | |  | | |  | | |  | | |  | | |
| Any other value received by the UE shall be treated as 0110 1111, "protocol error, unspecified". | | | | | | | | | | | | | | | | | | | | | | | | | |

\*\*\*\*\* End of changes \*\*\*\*\*