**3GPP TSG-CT WG1 Meeting #141eC1-232565**

**Online 17– 21 April 2023**

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| *CR-Form-v12.2* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
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|  |  | **CR** |  | **rev** |  | **Current version:** |  |  |
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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:*** | Handling of collision of PROSE PATH SWITCHING REQUEST message | | | | | | | | | |
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| ***Source to WG:*** |  | | | | | | | | | |
| ***Source to TSG:*** |  | | | | | | | | | |
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| ***Work item code:*** | 5G\_\_Ph2 | | | | |  | ***Date:*** | | |  |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **F** |  | | | | | ***Release:*** | | |  |
|  | *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)* | |
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| ***Reason for change:*** | | Path switching procedure from the direct communication path over PC5 to the direct communication path over Uu is introduced in CT1 in #140:  *A UE may initiate a path switching procedure from the direct communication path over PC5 to the direct communication path over Uu:*  *a) when the PC5 signal strength of the direct communication path over PC5 with the peer UE becomes weak (e.g. reaching a certain configured signal strength threshold); or*  *b) when the UE needs to switch the communication path from the direct communication path over PC5 to the direct communication path over Uu on demand (e.g. a request from upper layers).*  It can be seen that the conditions of initiating Path switching procedure for the two UEs are symmetrical:  a) if the signal strength of the PC5 link is weak for UE-1, it will be the same situation for UE-2 (i.e. UE-2 will find the PC5 link is weak as well); or  b) if the application layer asks UE-1 to switch the communication path, the same decision is likely to be made by UE-2.  So it is necessary to avoid this from happening.  Since in this case, the two UE will act as initiating UE, it is not recommended to stop the original procedure or ignore the new request message because it will cause a lot of delay to the whole procedure.  It is also not recommended to let the collision happen as the two message will finally lead to the same list of negotiated ProSe identifiers, it is a waste of UE resources.  It is proposed that the UE starts an implementation-specific timer before initiating a path switch procedure to avoid the collision of PROSE PATH SWITCHING REQUEST between two UEs.  For handling of PROSE PATH SWITCHING REQUEST messages, a similar mechanism of handling collision of link modification request message:  *c) For the same 5G ProSe direct link, if the initiating UE receives a PROSE DIRECT LINK MODIFICATION REQUEST message during the 5G ProSe direct link modification procedure, the initiating UE shall stop the timer T5081 and abort the 5G ProSe direct link modification procedure. Following handling is implementation dependent, e.g., the initiating UE waits for an implementation dependent time for initiating a new 5G ProSe direct link modification procedure, if still needed.*  For the target UE side, if the target UE is processing the path switching procedure from the direct communication path over PC5 to the direct communication path over Uu, upon receipt of a PROSE PATH SWITCHING REQUEST message from the same initiating UE, the target UE shall ignore the new received PROSE PATH SWITCHING REQUEST message. | | | | | | | | |
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| ***Summary of change:*** | | 1. Add an implementation-specific timer before initiating the path switching procedure;  2. clarify the abnormal case for clarifying the PROSE PATH SWITCHING REQUEST collision at the initiating UE side;  3. clarify the abnormal case for clarifying the PROSE PATH SWITCHING REQUEST collision at the target UE side | | | | | | | | |
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| ***Consequences if not approved:*** | | Collision of PROSE PATH SWITCHING REQUEST between two UEs | | | | | | | | |
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| ***Clauses affected:*** | | 7.7.3.2, 7.7.3.6.1, 7.7.3.6.2 | | | | | | | | |
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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:*** | |  | | | | | | | | |

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

#### 7.7.3.2 Path switching procedure from the direct communication path over PC5 to the direct communication path over Uu initiation by initiating UE

The initiating UE shall meet the following pre-conditions before initiating this procedure for switching the direct communication path over PC5 to the direct communication path over Uu:

a) the initiating UE and the target UE are communicating with each other via the 5G ProSe direct link over PC5 reference point; and

b) the communication mode of the 5G ProSe direct link is set to unicast mode.

In order to initiate the path switching procedure from the direct communication path over PC5 to the direct communication path over Uu, the initiating UE initiates an implementation-specific timer to avoid a potential collision of the path switching procedure. When the implementation-specific timer expires, the initiating UE shall create a PROSE PATH SWITCHING REQUEST message. In the PROSE PATH SWITCHING REQUEST message, the initiating UE:

a) shall include the required ProSe identifiers set to the ProSe identifier(s) of the authorized ProSe application(s) for which the communication path switching procedure is to be performed according to the ProSe application to path switching mapping rules as specified in clause 5.2.4; and

b) may include the Uu QoS flow descriptions set to the requested QoS flow description for each ProSe identifier to be used in the communication path over Uu.

NOTE 1: The initiating UE derives the requested QoS flow description(s) based on the PC5 QoS parameters of the PC5 QoS flow(s) between the initiating UE and the target UE.

After the PROSE PATH SWITCHING REQUEST message is generated, the initiating UE shall pass this message to the lower layers for transmission along with the source layer-2 ID and destination layer-2 ID used in the existing 5G ProSe direct link with the target UE and start timer T5aaa. The initiating UE shall not send a new PROSE PATH SWITCHING REQUEST message to the same target UE while timer T5aaa is running.



Figure 7.7.3.2.1: Path switching procedure from the direct communication path over PC5 to the direct communication path over Uu

Upon receipt of the PROSE PATH SWITCHING REQUEST message, the target UE:

a) may perform either of the following:

1) initiate the UE-requested PDU session establishment procedure as specified in clause 6.4.1 of 3GPP TS 24.501 [11] to establish a PDU session to be used for the direct communication path over Uu; or

2) initiate the UE-requested PDU session modification procedure as specified in clause 6.4.2 of 3GPP TS 24.501 [11] to modify a PDU session to be used for the direct communication path over Uu with the Requested QoS flow descriptions IE set to the QoS flow descriptions received in the PROSE PATH SWITCHING REQUEST message; and

Editor's note: It is FFS whether the UE needs to perform UE-requested PDU session establishment/modification procedure before accept the PROSE PATH SWITCHING REQUEST message.

b) shall determine if there are at least one ProSe application(s) that are able to perform the path switching procedure from the direct communication path over PC5 to the direct communication path over Uu in the PROSE PATH SWITCHING REQUEST message with the following considerations:

1) the ProSe application(s) that are not authorized to perform communication path switching procedure according to the ProSe application to path switching mapping rules as specified in clause 5.2.4 shall not be considered as be able to perform the path switching procedure from the direct communication path over PC5 to the direct communication path over Uu; and

2) other criteria (e.g. availability of direct communication path over Uu, result of bullet a), etc.) may be taken into consideration in addition to the ProSe application to path switching mapping rules as specified in clause 5.2.4.

NOTE 2: What other criteria are considered in the target UE side is left to UE implementations.

Editor's Note: It is FFS how to support the notification of UE when it cannot perform path switch.

\* \* \* Next Change \* \* \* \*

##### 7.7.3.6.1 Abnormal cases at the initiating UE

The following abnormal cases can be identified:

a) Expiry of timer T5aaa:

On the first expiry of the timer T5aaa, the UE shall resend the PROSE PATH SWITCHING REQUEST message and shall reset and restart timer T5aaa. This retransmission is repeated two times, i.e. on the third expiry of timer T5aaa, the UE shall abort the procedure and consider the target UE is not in proximity or the path switching procedure from the direct communication path over PC5 to the direct communication path over Uu is not accepted by the target UE.

b) For the same 5G ProSe direct link, if the initiating UE receives a PROSE PATH SWITCHING REQUEST message during the path switching procedure from the direct communication path over PC5 to the direct communication path over Uu, the initiating UE shall stop the timer T5aaa and abort the initiated procedure. Following handling is implementation dependent, e.g., the initiating UE waits for an implementation dependent time for initiating a new PROSE PATH SWITCHING REQUEST towards the target UE, if still needed.

\* \* \* Next Change \* \* \* \*

##### 7.7.3.6.2 Abnormal cases at the target UE

The following abnormal cases can be identified:

a) For the same 5G ProSe direct link, if the target UE is processing the path switching procedure from the direct communication path over PC5 to the direct communication path over Uu and the implementation-specific timer as specified in clause 7.7.3.2 is not running, upon receipt of a PROSE PATH SWITCHING REQUEST message from the same initiating UE, the target UE shall ignore the new received PROSE PATH SWITCHING REQUEST message.

b) For the same 5G ProSe direct link, if the implementation-specific timer as specified in clause 7.7.3.2 is running, upon receipt of a PROSE PATH SWITCHING REQUEST message from the initiating UE, the target UE shall stop the implementation-specific timer, process the received PROSE PATH SWITCHING REQUEST message, and shall not initiate a path switching procedure from the direct communication path over PC5 to the direct communication path over Uu to the initiating UE.

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