**3GPP TSG-CT WG1 Meeting #126-eC1-20xxxx**

**Electronic meeting, 15-23 October 2020 was C1-205824**

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| *CR-Form-v12.0* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **24.587** | **CR** | **0116** | **rev** | **1** | **Current version:** | **16.2.1** |  |
|  | | | | | | | | |
| *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:*** | Updates to link ID update procedure | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | vivo, Huawei, HiSilicon | | | | | | | | | |
| ***Source to TSG:*** | C1 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | eV2XARC | | | | |  | ***Date:*** | | | 2020-10-08 |
|  |  | | | |  | |  | | |  |
| ***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 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-12 (Release 12)* *Rel-13 (Release 13) Rel-14 (Release 14) Rel-15 (Release 15) Rel-16 (Release 16) Rel-17 (Release 17)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | During the Link ID update procedure, if the target UE receives the new application layer ID from upper layer, it **shall** include target UE’s new application layer ID in the DIRECT LINK IDENTIFIER UPDATE ACCEPT message, instead of **may**.  The same reason applies for the following cases:   * initiating UE's new IP address/prefix * initiating UE's new application layer ID * target UE's new IP address/prefix   For DIRECT LINK IDENTIFIER UPDATE ACK message, the initiating UE **shall** include the target UE's new application layer ID and the target UE's new IP address/prefix if received, instead of **may**.  T5009 has been defined, so Txxx needs to be replaced with T5009 in clause 6.1.2.5.6.  Upon receiving a DIRECT LINK IDENTIFIER UPDATE REQUEST message, the target UE shall stop T5011 if running, which is not reflected in the table 10.3.1. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | 1. Change **may** to **shall** for   - target UE’s new application layer ID  - initiating UE's new IP address/prefix  - initiating UE's new application layer ID  - target UE's new IP address/prefix  in DIRECT LINK IDENTIFIER UPDATE ACCEPT message.   1. Change **may** to **shall** for   - target UE's new application layer ID  - target UE's new IP address/prefix  in the DIRECT LINK IDENTIFIER UPDATE ACK message.   1. Change **may** to **shall** for   - initiating UE’s new application layer ID  - new IP address/prefix  in the DIRECT LINK IDENTIFIER UPDATE REQUEST message.   1. capture that upon receiving a DIRECT LINK IDENTIFIER UPDATE REQUEST message, the UE shall stop T5011 if running in the table 10.3.1. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | The conditions of inclusion of information in the DIRECT LINK IDENTIFIER UPDATE ACCEPT messge and the DIRECT LINK IDENTIFIER UPDATE ACCEPT ACK message are incorrect and not aligned with the definition of those messages and their contents under clause 7. This can result in implementers incorrectly coding the message and its contents when the PC5 unicast link identifier update procedure. Hence, different implementations are possible and also the update and exchange of (new) identifiers (e.g., application layer ID, layer-2 ID, security information and IP address/prefix) between two UEs will be incorrect. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 6.1.2.5.2, 6.1.2.5.3, 6.1.2.5.4, 10.3 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **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 \* \* \* \*

##### 6.1.2.5.2 PC5 unicast link identifier update procedure initiation by initiating UE

The initiating UE shall initiate the procedure if:

a) the initiating UE receives a request from upper layers to change the application layer ID and there is an existing PC5 unicast link associated with this application layer ID; or

b) the privacy timer (see clause 5.2.3) of the initiating UE's layer-2 ID expires for an existing PC5 unicast link.

If the PC5 unicast link identifier update procedure is triggered by a change of the initiating UE’s application layer ID, the initiating UE shall stop timer T5011 if running and create a DIRECT LINK IDENTIFIER UPDATE REQUEST message. In this message, the initiating UE

a) shall include the initiating UE’s new application layer ID received from upper layer;

b) shall include the initiating UE’s new layer-2 ID assigned by itself;

c) shall include the new MSB of KNRP-sess ID; and

d) shall include the new IP address/prefix if changed and IP communication is used.

If the PC5 unicast link identifier update procedure is triggered by the expiry of the initiating UE's privacy timer T5011 as specified in clause 5.2.3, the initiating UE shall create a DIRECT LINK IDENTIFIER UPDATE REQUEST message. In this message, the initiating UE

a) shall include the initiating UE's new layer-2 ID assigned by itself;

b) shall include the new MSB of KNRP-sess ID;

c) shall include the initiating UE’s new application layer ID if received from upper layer; and

d) shall include the new IP address/prefix if changed and IP communication is used.

After the DIRECT LINK IDENTIFIER UPDATE REQUEST message is generated, the initiating UE shall pass this message to the lower layers for transmission along with the initiating UE's old layer-2 ID and the target UE's layer-2 ID, and start timer T5009. The UE shall not send a new DIRECT LINK IDENTIFIER UPDATE REQUEST message to the same target UE while timer T5009 is running.



Figure 6.1.2.5.2.1: PC5 unicast link identifier update procedure

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

##### 6.1.2.5.3 PC5 unicast link identifier update procedure accepted by the target UE

Upon receipt of a DIRECT LINK IDENTIFIER UPDATE REQUEST message, if the target UE determines:

a) the PC5 unicast link associated with this request message is still valid; and

b) the timer T5010 for the PC5 unicast link identified by this request message is not running,

then the target UE accepts this request, stops timer T5011 if running and responds with a DIRECT LINK IDENTIFIER UPDATE ACCEPT message.

The target UE shall create the DIRECT LINK IDENTIFIER UPDATE ACCEPT message. In this message, the target UE:

a) shall include the target UE's new layer-2 ID assigned by itself;

b) shall include the new LSB of KNRP-sess ID;

c) shall include the initiating UE's new MSB of KNRP-sess ID;

d) shall include the initiating UE's new layer-2 ID;

e) shall include the target UE’s new application layer ID if received from upper layer;

f) shall include the initiating UE's new IP address/prefix if received from the initiating UE and IP communication is used;

g) shall include the initiating UE's new application layer ID if received from the initiating UE; and

h) shall include the target UE's new IP address/prefix if changed and IP communication is used.

After the DIRECT LINK IDENTIFIER UPDATE ACCEPT message is generated, the target UE shall pass this message to the lower layers for transmission along with the initiating UE's old layer-2 ID and the target UE's old layer-2 ID, and start timer T5010. The UE shall not send a new DIRECT LINK IDENTIFIER UPDATE ACCEPT message to the same initiating UE while timer T5010 is running.

Before target UE receives the traffic using the new layer-2 IDs, the target UE shall continue to receive the traffic with the old layer-2 IDs (i.e. initiating UE’s old layer-2 ID and target UE’s old layer-2 ID) from initiating UE.

Before target UE receives the DIRECT LINK IDENTIFIER UPDATE ACK message from initiating UE, the target UE shall keep sending traffic to the initiating UE using the old layer-2 IDs (i.e. initiating UE’s old layer-2 ID and target UE’s old layer-2 ID).

\* \* \* Second Change \* \* \* \*

##### 6.1.2.5.4 PC5 unicast link identifier update procedure acknowledged by the initiating UE

Upon receipt of the DIRECT LINK IDENTIFIER UPDATE ACCEPT message, the initiating UE shall stop timer T5009 and respond with a DIRECT LINK IDENTIFIER UPDATE ACK message. In this message, the initiating UE:

a) shall include the target UE's new layer-2 ID;

b) shall include the target UE's new LSB of KNRP-sess ID;

c) shall include the target UE's new application layer ID, if received; and

d) shall include the target UE's new IP address/prefix, if received.

After the DIRECT LINK IDENTIFIER UPDATE ACK message is generated, the initiating UE shall pass this message to the lower layers for transmission along with the initiating UE's old layer-2 ID and the target UE's old layer-2 ID and shall start timer T5011 as configured.

Upon sending the DIRECT LINK IDENTIFIER UPDATE ACK message, the initiating UE shall update the associated PC5 unicast link context with the new identifiers and pass the new layer-2 IDs (i.e. initiating UE's new layer-2 ID and target UE's new layer-2 ID if changed) along with the PC5 link identifier down to the lower layer. Then the initiating UE shall use the new layer-2 IDs (i.e. initiating UE's new layer-2 ID and target UE’s new layer-2 ID if changed) to transmit the PC5 signalling message and PC5 user plane data.

The initiating UE shall continue to receive traffic with the old layer-2 IDs (i.e. initiating UE's old layer-2 ID and target UE's old layer-2 ID) from the target UE until it receives traffic with the new layer-2 IDs (i.e. initiating UE's new layer-2 ID and target UE's new layer-2 ID if changed) from the target UE.

\* \* \* Fourth Change \* \* \* \*

## 10.3 Timers of PC5 unicast link management procedures

Table 10.3.1: PC5 unicast link management timers

| TIMER NUM. | | TIMER VALUE | CAUSE OF START | NORMAL STOP | ON  EXPIRY |
| --- | --- | --- | --- | --- | --- |
| T5000 | | 8s | Upon sending a DIRECT LINK ESTABLISHMENT REQUEST message | Upon receiving a DIRECT LINK ESTABLISHMENT ACCEPT or DIRECT LINK ESTABLISHMENT REJECT message from the target UE | Retransmission of DIRECT LINK ESTABLISHMENT REQUEST message |
| T5001 | | 5s | Upon sending a DIRECT LINK MODIFICATION REQUEST message | Upon receiving a DIRECT LINK MODIFICATION ACCEPT or DIRECT LINK MODIFICATION REJECT or DIRECT LINK RELEASE REQUEST message from the target UE | Retransmission of DIRECT LINK MODIFICATION REQUEST message |
| T5002 | | 5s | Upon sending a DIRECT LINK RELEASE REQUEST message | Upon receiving a DIRECT LINK RELEASE ACCEPT message from the target UE | Retransmission of DIRECT LINK RELEASE REQUEST message |
| T5003 | | 5s | Upon receiving a PC5 signalling message or PC5 user plane data | Upon PC5 unicast link release or upon initiating the PC5 unicast link keep-alive procedure | Initiate the PC5 unicast link keep-alive procedure |
| T5004 | | 5s | Upon sending a DIRECT LINK KEEPALIVE REQUEST message | Upon receiving a PC5 signalling message or PC5 user plane data | Retransmission of the DIRECT LINK KEEPALIVE REQUEST message |
| T5005 | | Default 10m  NOTE 1 | Upon receiving a Maximum inactivity period in a DIRECT LINK KEEPALIVE REQUEST message, receiving a PC5 signalling message or receiving PC5 user plane data | Upon receiving a PC5 signalling message or PC5 user plane data | Either initiate the PC5 unicast link keep-alive procedure or the PC5 unicast link release procedure |
| T5006 | | 2s | Upon sending a DIRECT LINK AUTHENTICATION REQUEST message | Upon receiving a DIRECT LINK AUTHENTICATION RESPONSE or DIRECT LINK AUTHENTICATION REJECT message from the target UE | Retransmission of DIRECT LINK AUTHENTICATION REQUEST message |
| T5007 | | 2s | Upon sending a DIRECT LINK SECURITY MODE COMMAND message | Upon receiving a DIRECT LINK SECURITY MODE COMPLETE or DIRECT LINK SECURITY MODE REJECT message from the target UE | Retransmission of DIRECT LINK SECURITY MODE COMMAND message |
| T5008 | | 8s | Upon sending a DIRECT LINK REKEYING REQUEST message | Upon receiving a DIRECT LINK REKEYING RESPONSE message or DIRECT LINK RELEASE REQUEST message from the target UE | Retransmission of DIRECT LINK REKEYING REQUEST message |
| T5009 | | 2s | Upon sending a DIRECT LINK IDENTIFIER UPDATE REQUEST message | Upon receiving a DIRECT LINK IDENTIFIER UPDATE ACCEPT or DIRECT LINK IDENTIFIER UPDATE REJECT or DIRECT LINK RELEASE REQUEST message from the target UE | Retransmission of the DIRECT LINK IDENTIFIER UPDATE REQUEST message |
| T5010 | | 2s | Upon sending a DIRECT LINK IDENTIFIER UPDATE ACCEPT message | Upon receiving a DIRECT LINK IDENTIFIER UPDATE ACK message or DIRECT LINK RELEASE REQUEST message from the initiating UE | Retransmission of the DIRECT LINK IDENTIFIER UPDATE ACCEPT message |
| T5011 | |  | Upon establishing a unicast link configured with privacy | Upon receiving a trigger for link identifier update from the upper layer or receiving a DIRECT LINK IDENTIFIER UPDATE REQUEST message or upon link release | Transmission of LINK IDENTIFIER UPDATE REQUEST message |
| NOTE 1 The default value of this timer is used if the DIRECT LINK KEEPALIVE REQUEST message does not provide a timer value in the Maximum inactivity period IE, | | | | | |

\* \* \* End of Change \* \* \* \*