**3GPP TSG-CT WG1 Meeting #134-eC1-221493**

**E-Meeting, 17th – 25th February 2022**

**Source: Nokia, Nokia Shanghai Bell**

**Title: Including the SUCI of the remote UE in the direct link establishment request procedure**

**Spec: 3GPP TS** **TS 24.554 V1.1.0**

**Agenda item: 17.2.18**

**Document for: Agreement**

**1. Reason for Change**

As specified in clause 6.3.3.3.2 in TS 33.503 for the security procedure over Control Plane of Layer-3 UE-to-network relay case:

*The Remote UE shall include its security capabilities and security policy in the DCR message as specified in TS 33.536 [6]. The message shall also include SUCI, Relay Service Code, Nonce\_1.*

Hence the PROSE DIRECT LINK ESTABLISHMENT REQUEST message shall be extended to carry the SUCI of the remote UE in layer-3 relay case, and the needed changes in the procedure shall be captured, which are done with this pCR.

**2. Proposal**

It is proposed to agree the following changes to 3GPP TS 24.554 V1.1.0.

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

#### 7.2.2.2 5G ProSe direct link establishment procedure initiation by initiating UE

The initiating UE shall meet the following pre-conditions before initiating this procedure:

a) a request from upper layers to transmit the packet for ProSe application over PC5;

b) the communication mode is unicast mode (e.g., pre-configured as specified in clause 5.2.4 or indicated by upper layers);

c) the link layer identifier for the initiating UE (i.e., layer-2 ID used for unicast communication) is available (e.g., pre-configured or self-assigned) and is not being used by other existing 5G ProSe direct links within the initiating UE;

d) the link layer identifier for the destination UE (i.e., the unicast layer-2 ID of the target UE or the broadcast layer-2 ID) is available to the initiating UE (e.g., pre-configured, obtained as specified in clause 5.2 or known via prior ProSe direct communication);

NOTE 1: In the case where different ProSe applications are mapped to distinct default destination layer-2 IDs, when the initiating UE intends to establish a single unicast link that can be used for more than one ProSe identifiers, the UE can select any of the default destination layer-2 ID for unicast initial signalling.

e) the initiating UE is either authorised for 5G ProSe direct communication over PC5 in NR-PC5 in the serving PLMN, has a valid authorization for 5G ProSe direct communication over PC5 in NR-PC5 when not served by NG-RAN, or is authorized to use a 5G ProSe UE-to-network relay UE. The UE considers that it is not served by NG-RAN if the following conditions are met:

1) not served by NG-RAN for ProSe direct communication over PC5;

2) in limited service state as specified in 3GPP TS 23.122 [14], if the reason for the UE being in limited service state is one of the following;

i) the UE is unable to find a suitable cell in the selected PLMN as specified in 3GPP TS 38.304 [15];

ii) the UE received a REGISTRATION REJECT message or a SERVICE REJECT message with the 5GMM cause #11 "PLMN not allowed" as specified in 3GPP TS 24.501 [11]; or

iii) the UE received a REGISTRATION REJECT message or a SERVICE REJECT message with the 5GMM cause #7 "5GS services not allowed" as specified in 3GPP TS 24.501 [11]; or

3) in limited service state as specified in 3GPP TS 23.122 [14] for reasons other than i), ii) or iii) above, and located in a geographical area for which the UE is provisioned with "non-operator managed" radio parameters as specified in clause 5.2;

f) there is no existing 5G ProSe direct link for the pair of peer application layer IDs, or there is an existing 5G ProSe direct link for the pair of peer application layer IDs and:

1) the network layer protocol of the existing 5G ProSe direct link is not identical to the network layer protocol required by the upper layer in the initiating UE for this ProSe application;

2) the security policy (either signalling security policy or user plane security policy) corresponding to the ProSe identifier is not compatible with the security policy of the existing PC5 unicast link; or

3) in case of the 5G ProSe direct link establishment procedure is for direct communication between the remote UE and the UE-to-network relay UE, the existing 5G ProSe direct link for the peer UE is established with a different RSC or without a RSC;

g) the number of established 5G ProSe direct links is less than the implementation-specific maximum number of established 5G ProSe direct links allowed in the UE at a time; and

h) timer T5088 is not associated with the link layer identifier for the destination UE or timer T5088 associated with the link layer identifier for the destination UE has already expired or stopped.

After receiving the service data or request from the upper layers, the initiating UE shall derive the PC5 QoS parameters and assign the PQFI(s) for the PC5 QoS flows(s) to be established as specified in clause 7.2.7.

In order to initiate the 5G ProSe direct link establishment procedure, the initiating UE shall create a PROSE DIRECT LINK ESTABLISHMENT REQUEST message. The initiating UE:

a) shall include the source user info set to the initiating UE's application layer ID received from upper layers;

b) shall include the ProSe identifier(s) received from upper layer if the 5G ProSe direct link establishment procedure is not for 5G ProSe direct communication between the remote UE and the UE-to-network relay UE;

c) shall include the target user info set to the target UE's application layer ID if received from upper layers, or to the identity of the 5G ProSe UE-to-network relay UE obtained during the 5G ProSe UE-to-network relay discovery procedure, or if the destination layer-2 ID is the unicast layer-2 ID of target UE;

Editor's note: The following steps d) till i) are FFS as they are waiting for the definitions in SA3 specification by SA3 working group.

d) shall include the key establishment information container if the UE PC5 unicast signalling integrity protection policy is set to "signalling integrity protection required" or "signalling integrity protection preferred", and may include the key establishment information container if the UE PC5 unicast signalling integrity protection policy is set to "signalling integrity protection not needed";

NOTE 2: The key establishment information container is provided by upper layers.

e) shall include a Nonce\_1 set to the 128-bit nonce value generated by the initiating UE for the purpose of session key establishment over this 5G ProSe direct link if the UE PC5 unicast signalling integrity protection policy is set to "signalling integrity protection required" or "signalling integrity protection preferred";

f) shall include its UE security capabilities indicating the list of algorithms that the initiating UE supports for the security establishment of this PC5 unicast link;

g) shall include the Most Significant 8 Bits (MSB) of KNRP-sess ID chosen by the initiating UE as specified in 3GPP TS 33.503 [34] if the UE PC5 unicast signalling integrity protection policy is set to "signalling integrity protection required" or "signalling integrity protection preferred";

h) may include a KNRP ID if the initiating UE has an existing KNRP for the target UE;

i) shall include its UE PC5 unicast signalling security policy. In the case where the different ProSe applications are mapped to the different PC5 unicast signalling security policies, when the initiating UE intends to establish a single unicast link that can be used for more than one ProSe application, each of the signalling security polices of those ProSe applications shall be compatible, e.g., "signalling integrity protection not needed" and "signalling integrity protection required" are not compatible. In case the 5G ProSe direct link establishment procedure is for direct communication between 5G ProSe layer-3 remote UE and 5G ProSe layer-3 UE-to-network relay UE, the Signalling integrity protection policy shall be set to "Signalling integrity protection required";

j) shall include the Relay service code IE set to the relay service code of the target relay UE if the 5G ProSe direct link establishment procedure is for direct communication between the remote UE and the UE-to-network relay UE; and

h) shall include the UE identity IE set to the SUCI of the initiating UE if:

1) the 5G ProSe direct link establishment procedure is for direct communication between the 5G ProSe layer-3 remote UE and the 5G ProSe layer-3 UE-to-network relay UE; and

2) the control plane based solution for 5G ProSe layer-3 relay is followed.

Editor's note: It is FFS how the UE determines whether control plane based solution or user plane based solution is used.

After the PROSE DIRECT LINK ESTABLISHMENT REQUEST message is generated, the initiating UE shall pass this message to the lower layers for transmission along with the initiating UE's layer-2 ID for unicast communication and:

a) the destination layer-2 ID used for unicast initial signaling; or

b) the destination layer-2 ID set to the source layer-2 ID of the selected 5G ProSe UE-to-network relay UE during the 5G ProSe UE-to-network relay discovery procedure as defined in clause 8.2.1;

and start timer T5080.

The UE shall not send a new PROSE DIRECT LINK ESTABLISHMENT REQUEST message to the same target UE identified by the same application layer ID while timer T5080 is running. If the target user info IE is not included in the PROSE DIRECT LINK ESTABLISHMENT REQUEST message (i.e., ProSe application oriented 5G ProSe direct link establishment procedure), the initiating UE shall handle multiple PROSE DIRECT LINK ESTABLISHMENT ACCEPT messages, if any, received from different target UEs for the establishment of multiple 5G ProSe direct links before the expiry of timer T5080.

NOTE 3: In order to ensure successful 5G ProSe direct link establishment, T5080 should be set to a value larger than the sum of T5089 and Tzzzz.



Figure 7.2.2.2.1: UE oriented 5G ProSe direct link establishment procedure



Figure 7.2.2.2.2: ProSe service oriented 5G ProSe direct link establishment procedure

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

#### 10.3.1.1 Message definition

This message is sent by a UE to another peer UE to establish a direct link. See table 10.3.1.1.1.

Message type: PROSE DIRECT LINK ESTABLISHMENT REQUEST

Significance: dual

Direction: UE to peer UE

Table 10.3.1.1.1: PROSE DIRECT LINK ESTABLISHMENT REQUEST message content

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| IEI | Information Element | Type/Reference | Presence | Format | Length |
|  | PROSE DIRECT LINK ESTABLISHMENT REQUEST message identity | ProSe PC5 signalling message type  11.3.1 | M | V | 1 |
|  | Sequence number | Sequence number  11.3.2 | M | V | 1 |
|  | Source user info | Application layer ID  11.3.4 | M | LV | 2-256 |
|  | UE security capabilities | UE security capabilities  11.3.11 | M | LV | 3-9 |
|  | UE PC5 unicast signalling security policy | UE PC5 unicast signalling security policy  11.3.12 | M | V | 1 |
| 7B | ProSe identifiers | ProSe identifier  11.3.3 | O | TLV-E | 21-65538 |
| 74 | Key establishment information container | Key establishment information container  11.3.9 | O | TLV-E | 4-65538 |
| 56 | Nonce\_1 | Nonce  11.3.10 | O | TV | 17 |
| 5C | MSB of KNRP-sess ID | MSB of KNRP-sess ID  11.3.13 | O | TV | 2 |
| 28 | Target user info | Application layer ID  11.3.4 | O | TLV | 3-257 |
| 58 | KNRP ID | KNRP ID  11.3.14 | O | TV | 5 |
| 54 | Relay service code | Relay service code  11.3.26 | O | TV | 4 |
| XY | UE identity | 5GS mobile identity  11.3.ZZ | O | TLV-E | 4-n |

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

#### 10.3.1.2 UE identity

The UE shall include this IE if the 5G ProSe direct link establishment procedure is for direct communication between the 5G ProSe layer-3 remote UE and the 5G ProSe layer-3 UE-to-network relay UE.

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

### 11.3.ZZ 5GS mobile identity

See subclause 9.11.3.4 in 3GPP TS 24.501 [11] with Type of identity set to "SUCI".

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