**3GPP TSG-CT WG1 Meeting #141eC1-232578**

**Online 17– 21 April 2023**

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| *CR-Form-v12.2* |
| **CHANGE REQUEST** |
|  |
|  | **24.554** | **CR** | **0329** | **rev** | **1** | **Current version:** | **18.0.0** |  |
|  |
| *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:***  | Update target discoveree end UE in UE-to-UR relay discovery procedure |
|  |  |
| ***Source to WG:*** | Xiaomi |
| ***Source to TSG:*** | C1 |
|  |  |
| ***Work item code:*** | 5G\_ProSe\_Ph2 |  | ***Date:*** | 2023-04-08 |
|  |  |  |  |  |
| ***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 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-16 (Release 16)Rel-17 (Release 17)Rel-18 (Release 18)Rel-19 (Release 19)* |
|  |  |
| ***Reason for change:*** | For UE-to-UE relay discovery procedrue, the target 5G ProSe end UE is required for either the procedure with mode A or the procedure with mode B. So the target 5G ProSe end UE should be mandatory in the related message and protocol procedure. |
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| ***Summary of change:*** | 1. Update the UE-to-UE relay discovery related message and protocol procedure to make the target 5G ProSe end UE mandatory.
2. Some format update.
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| ***Consequences if not approved:*** | The implementation is not aligned with stage 2. |
|  |  |
| ***Clauses affected:*** | 8a.2.1.2.3.2, 8a.2.1.2.3.3, 8a.2.1.3, 8a.2.1.7, 10.2.1, 10.2.8 |
|  |  |
|  | **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 \* \* \* \*

###### 8a.2.1.2.3.2 Monitoring UE procedure for UE-to-UE relay discovery initiation

The UE is authorised to perform the monitoring UE procedure for UE-to-UE relay discovery if:

a) the following is true:

1) the UE is not served by NG-RAN, is authorised to perform 5G ProSe direct discovery using monitoring when the UE is not served by NG-RAN and is configured with the radio parameters to be used for 5G ProSe direct discovery when not served by NG-RAN;

2) the UE is served by NG-RAN and is authorised to perform 5G ProSe direct discovery monitoring in at least one PLMN; or

3) the UE is:

i) in 5GMM-IDLE mode, in limited service state as specified in 3GPP TS 23.122 [14] and the reason for the UE being in limited service state is one of the following:

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

B) 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

C) 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]; and

Editor's note: The UE behavior in limited service state needs to be revisited, which will be determined by SA2.

ii) authorised to perform 5G ProSe direct discovery using monitoring when the UE is not served by NG-RAN, and:

A) configured with the radio parameters to be used for 5G ProSe direct discovery when not served by NG-RAN; and

b) the UE is configured with the relay service code parameter identifying the connectivity service to be monitored, as specified in clause 5.2.x;

otherwise, the UE is not authorised to perform the monitoring UE procedure for UE-to-UE relay discovery.

Figure 8a.2.1.2.3.2.1 illustrates the interaction of the UEs in the monitoring UE procedure for UE-to-UE relay discovery.



Figure 8a.2.1.2.3.2.1: Monitoring UE procedure for UE-to-UE relay discovery

When the UE is triggered by the upper layers to monitor proximity of a connectivity service provided by a UE-to-UE relay or when the UE decides to perform 5G ProSe UE-to-UE relay reselection as specified in clause 8a.2.3, and if the UE is authorised to perform the monitoring UE procedure for UE-to-UE relay discovery, then the UE shall instruct the lower layers to start monitoring for PROSE PC5 DISCOVERY messages with the default destination layer-2 ID as specified in clause 5.2.x.

Editor's note: The security related contents are FFS and depend on SA3 requirements.

NOTE 2: The UE can determine the received PROSE PC5 DISCOVERY message for UE-to-UE relay discovery announcement is for 5G ProSe direct discovery based on an indication from the lower layer.

Then if:

a) the relay service code parameter of the PROSE PC5 DISCOVERY message for UE-to-UE relay discovery announcement is the same as the relay service code parameter configured as specified in clause 5 for the connectivity service being monitored; and

b) the 5G ProSe end UE list parameter of the PROSE PC5 DISCOVERY message for UE-to-UE relay discovery announcement contains the user info of the target end UE if the user info of the target end UE is provided by upper layers for the connectivity service being monitored,

then the UE shall consider that the connectivity service the UE seeks to monitor has been discovered. In addition, the UE can measure the signal strength of the PROSE PC5 DISCOVERY message for UE-to-UE relay discovery announcement for UE-to-UE relay selection or reselection.

###### 8a.2.1.2.3.3 Monitoring UE procedure for UE-to-UE relay discovery completion

When the UE is triggered by the upper layers to stop monitoring proximity of other UEs for 5G ProSe UE-to-UE relay, or when the UE stops being authorised to perform the monitoring UE procedure for UE-to-UE relay discovery, the UE shall instruct the lower layers to stop monitoring.

When the UE stops monitoring, if the UE is in 5GMM-CONNECTED mode, the UE shall trigger the corresponding procedure in lower layers as specified in 3GPP TS 38.331 [13].

#### 8a.2.1.3 UE-to-UE relay discovery over PC5 interface with model B

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

###### 8a.2.1.3.2.2 Discoverer end UE procedure for UE-to-UE relay discovery initiation

The UE is authorised to perform the discoverer end UE procedure for UE-to-UE relay discovery if:

a) one of the following is true:

1) the UE is not served by NG-RAN, is authorised to act as a 5G ProSe end UE towards a 5G ProSe UE-to-UE relay UE and is configured with the radio parameters to be used for ProSe UE-to-UE relay discovery when not served by NG-RAN;

2) the UE is served by NG-RAN, is authorised to act as a 5G ProSe end UE towards a 5G ProSe UE-to-UE relay UE; or

3) the UE is:

i) in 5GMM-IDLE mode, in limited service state as specified in 3GPP TS 23.122 [14] and the reason for the UE being in limited service state is one of the following:

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

B) 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

C) 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]; and

Editor's note: The UE behavior in limited service state needs to be revisited, which will be determined by SA2.

ii) authorised to act as a 5G ProSe end UE towards a 5G ProSe UE-to-UE relay UE when the UE is not served by NG-RAN and configured with the radio parameters to be used for ProSe UE-to-UE relay discovery use when not served by NG-RAN;

b) the UE is configured with:

1) the relay service code parameter identifying the connectivity service provided by a UE-to-UE relay to be solicited; and

Editor's note: The security related contents are FFS and depend on SA3 requirements.

2) the user info ID for the UE-to-UE relay discovery parameter, as specified in clause 5.2.7.

otherwise, the UE is not authorised to perform the discoverer end UE procedure for UE-to-UE relay discovery.

Figure 8a.2.1.3.2.2.1 illustrates the interaction of the UEs in the discoverer end UE procedure for UE-to-UE relay discovery.



Figure 8a.2.1.3.2.2.1: Discoverer end UE procedure for UE-to-UE Relay discovery

For PROSE PC5 DISCOVERY message signal strength measurement, the UE manages a periodic measurement timer T51yy, which is used to trigger the periodic PROSE PC5 DISCOVERY message signal strength measurement between the UE and the ProSe UE-to-UE relay UE with which the UE has a link established. It is started whenever the UE has established a direct link with a 5G ProSe UE-to-UE relay UE and restarted whenever the UE receives the PROSE PC5 DISCOVERY message for UE-to-UE relay discovery response from the 5G ProSe UE-to-UE relay UE with which the UE has a link established.

When the UE is triggered by the upper layers to solicit proximity of a connectivity service provided by a 5G ProSe UE-to-UE relay UE to communicate with a target discoveree end UE, or when the periodic measurement timer T51yy expires and if the UE is authorised to perform the discoverer end UE procedure for UE-to-UE relay discovery, then the UE:

a) if the UE is served by NG-RAN and the UE in 5GMM-IDLE mode needs to request resources for sending PROSE PC5 DISCOVERY messages for relay discovery as specified in 3GPP TS 38.331 [13], shall perform a service request procedure as specified in 3GPP TS 24.501 [11];

b) shall obtain a valid UTC time for the discovery transmission from the lower layers and generate the UTC-based counter corresponding to this UTC time;

c) shall generate a PROSE PC5 DISCOVERY message for UE-to-UE relay discovery solicitation. In the PROSE PC5 DISCOVERY message for UE-to-UE relay discovery solicitation, the UE:

1) shall set the source discoverer end UE info parameter to the configured User info ID for the UE-to-UE relay discovery parameter, as specified in clause 5.2.x;

2) shall set the relay service code parameter to the relay service code parameter identifying the connectivity service to be solicited, configured in clause 5.2.x.

3) shall include the MIC filed computed as described in 3GPP TS 33.503 [34];4) shall set the UTC-based counter LSB parameter to the 4 least significant bits of the UTC-based counter;

5) shall set the ProSe direct discovery PC5 message type parameter as specified in table 10.2.1.13;

6) shall include the target discoveree end UE info parameter set to the user info ID of the targeted discoveree end UE if the user info ID of the targeted discoveree end UE is provided by the upper layers; and

7) may set the UE-to-UE relay UE info parameter to user info ID for the UE-to-UE relay UE, if known e.g. during previous 5G ProSe UE-to-UE relay discovery or 5G ProSe UE-to-UE relay communication procedure(s);

d) shall set the destination layer-2 ID to the default destination layer-2 ID as specified in clause 5.2.x and self-assign a source layer-2 ID for sending the UE-to-UE relay discovery solicitation message; and

NOTE 2: The UE implementation ensures that the value of the self-assigned source layer-2 ID is different from any other self-assigned source layer-2 ID(s) in use for 5G ProSe direct communication as specified in clause 7.2, is different from any other provisioned destination layer-2 ID(s) as specified in clause 5.2 and is different from any other self-assigned source layer-2 ID in use for a simultaneous 5G ProSe direct discovery procedure over PC5 with a different discovery model as specified in clause 6.2.14.2.1.2, clause 6.2.15.2.1.2, clause 8.2.1.2.2.2, clause 8.2.1.2.4.2 and clause 8a.2.1.2.2.2.

e) shall pass the resulting PROSE PC5 DISCOVERY message for UE-to-UE relay discovery solicitation along with the source layer-2 ID, destination layer-2 ID and an indication that the message is for 5G ProSe direct discovery to the lower layers for transmission over the PC5 interface.

Editor's note: The security related contents are FFS and depend on SA3 requirements.

If the PROSE PC5 DISCOVERY message for UE-to-UE relay discovery solicitation is used to solicit proximity of a connectivity service provided by a 5G ProSe UE-to-UE relay UE, the UE shall ensure that it keeps on passing the PROSE PC5 DISCOVERY message for UE-to-UE relay discovery solicitation for transmission until the UE is triggered by the upper layers to stop soliciting proximity of a connectivity service provided by a 5G ProSe UE-to-UE relay UE, or until the UE stops being authorised to perform the discoverer end UE procedure for UE-to-UE relay discovery. How this is achieved is left up to UE implementation.

NOTE 3: The discoverer end UE can stop discoverer end UE procedure for UE-to-UE relay discovery for power saving by implementation specific means e.g. an implementation-specific maximum number of 5G ProSe direct links configured in the UE, or an implementation-specific timer expires.

If the PROSE PC5 DISCOVERY message for UE-to-UE relay discovery solicitation is used to trigger the PROSE PC5 DISCOVERY message signal strength measurement between the UE and the 5G ProSe UE-to-UE Relay UE with which the UE has a link established, the UE shall start the retransmission timer T51xx. If retransmission timer T51xx expires, the UE shall retransmit the PROSE PC5 DISCOVERY message for UE-to-UE relay discovery solicitation and restart timer T51xx. If no response is received from the ProSe UE-to-UE relay UE with which the UE has a link established after reaching the maximum number of allowed retransmissions, the UE shall trigger relay reselection procedure.

NOTE 4: The maximum number of allowed retransmissions is UE implementation specific.

NOTE 5: The UE can determine the received PROSE PC5 DISCOVERY message for UE-to-UE relay discovery response is for 5G ProSe direct discovery based on an indication from the lower layer.

Then if:

a) the relay service code parameter of the PROSE PC5 DISCOVERY message for UE-to-UE relay discovery response is the same as the relay service code parameter of the PROSE PC5 DISCOVERY message for UE-to-UE relay discovery solicitation; and

b) the target discoveree end UE info parameter of the PROSE PC5 DISCOVERY message for UE-to-UE relay discovery response is the same as the user info ID of targeted discoveree end UE if the user info ID of targeted discoveree end UE is provided by upper layers for the connectivity service being solicited,

then the UE shall consider that the connectivity service the UE seeks to discover has been discovered. In addition, the UE can measure the signal strength of the PROSE PC5 DISCOVERY message for UE-to-UE relay discovery response for relay selection or reselection. If the UE has received the PROSE PC5 DISCOVERY message for UE-to-UE relay discovery response from the ProSe UE-to-UE Relay UE with which the UE has a link established, the UE shall stop the retransmission timer T51xx and start the periodic measurement timer T51yy.

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

#### 8a.2.7.1 General

This clause describes the QoS handling between a 5G ProSe UE-to-UE relay UE and two 5G ProSe end UEs. The purpose of QoS handling for 5G ProSe UE-to-UE relay is to meet the end-to-end QoS requirement between two 5G ProSe end UEs.

The QoS handling for 5G ProSe UE-to-UE relay can be classified with the following three cases according to the type of 5G ProSe UE-to-UE relay:

a) QoS handling for two 5G ProSe end UEs via a 5G ProSe layer-2 UE-to-UE relay; and

b) QoS handling for two 5G ProSe end UEs via a 5G ProSe layer-3 UE-to-UE relay.

#### 8a.2.7.2 QoS handling for 5G ProSe layer-3 UE-to-UE relay

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

### 10.2.1 Message definition

This message is sent by the UE over the PC5 interface for open 5G ProSe direct discovery and restricted 5G ProSe direct discovery. See table 10.2.1.1, table 10.2.1.2, table 10.2.1.3, table 10.2.1.4, table 10.2.1.5, table 10.2.1.6, table 10.2.1.7, table 10.2.1.8, table 10.2.1.9, table 10.2.1.10 and table 10.2.1.11.

Message type: PROSE PC5 DISCOVERY

Significance: dual

Direction: UE to peer UE

…

Table 10.2.1.13: PROSE PC5 DISCOVERY message for UE-to-UE relay discovery solicitation

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| IEI | Information Element | Type/Reference | Presence | Format | Length |
|  | ProSe direct discovery PC5 message type (NOTE 1) | ProSe direct discovery PC5 message type11.2.1 | M | V | 1 |
|  | UTC-based counter LSB | UTC-based counter LSB11.2.11 | M | V | 1 |
|  | MIC | MIC11.2.4 | M | V | 4 |
|  | Relay service code | Relay service code11.2.8 | M | V | 3 |
|  | Source discoverer end UE info | User info ID11.2.7 | M | LV | tbd |
| xx | Target discoveree end UE info | User info ID11.2.7 | M | TLV | tbd |
| xa | UE-to-UE relay UE info | User info ID11.2.7 | O | TLV | tdb |
| xb | Status indicator | Status indicator11.2.9 | O | TV | 2 |
| NOTE 1: The discovery type is set to "Restricted discovery", the content type is set to "UE-to-UE relay discovery solicitation" and the discovery model is set to "Model B". |

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

10.2.8 Target discoveree end UE info

The target discoveree end UE info IE shall be included in PROSE PC5 DISCOVERY message for UE-to-UE relay discovery discovery solicitation as in table 10.2.1.13, if the message is sent by the source 5G ProSe end UE or the message is sent by the 5G ProSe UE-to-UE relay UE.

The target discoveree end UE info IE shall be included in PROSE PC5 DISCOVERY message for UE-to-UE relay discovery discovery response as in table 10.2.1.14 if the message is sent by the 5G ProSe UE-to-UE relay UE or if the message is sent by the target 5G ProSe end UE.

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