**3GPP TSG-CT WG1 Meeting #141eC1-232515**

**Electronic, 17 – 21 April 2023**

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| *CR-Form-v12.2* |
| **CHANGE REQUEST** |
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|  | **24.554** | **CR** | **0310** | **rev** | **-** | **Current version:** | **18.0.0** |  |
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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:***  | Update to U2U relay discovery procedures |
|  |  |
| ***Source to WG:*** | CATT |
| ***Source to TSG:*** | C1 |
|  |  |
| ***Work item code:*** | 5G\_ProSe\_Ph2 |  | ***Date:*** | 2023-04-10 |
|  |  |  |  |  |
| ***Category:*** | B |  | ***Release:*** | Rel-18 |
|  | *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:*** | 1) There is an EN in announcing UE procedure for UE-to-UE relay discovery initiation as follows:Editor's note: It is FFS on the case when the announcing UE updates the list of user info ID(s) of the 5G ProSe end UE(s).The announcing UE may update the list of user infor ID(s) of the 5G ProSe end UE(s) in the subsequent PROSE PC5 DISCOVERY message for UE-to-UE relay discovery announcement, similar to updating other parameters (e.g. RSC). So this EN can simply be removed.2) The discoverer end UE "shall" (instead of "may") include the target discoveree end UE info parameter set to the user info ID of the targeted discoveree end UE in the PROSE PC5 DISCOVERY message, according to current SA2 requirement.3) Since the target discoveree end UE info parameter is included in the PROSE PC5 DISCOVERY message for UE-to-UE relay discovery solicitation received from the discoverer end UE, the 5G ProSe UE-to-UE relay UE "shall" (instead of "may") set the target discoveree end UE info in the PROSE PC5 DISCOVERY message for UE-to-UE relay discovery solicitation to the discoveree end UE.4) Editorial modifications are needed, e.g. fixing the referenced clause number, aligning the description of Model B procedures in General clause with the subclauses, changing "relay" to "UE-to-UE relay". |
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| ***Summary of change:*** | 1. Resolve the EN on the case when the announcing UE updates the list of user info ID(s) of the 5G ProSe end UE(s).2. Modify the description of target discoveree end UE info parameter setting.3. Editorial modifications. |
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| ***Consequences if not approved:*** | Incomplete or incorrect description of U2U relay discovery procedures. |
|  |  |
| ***Clauses affected:*** | 8a.2.1.2.2.2, 8a.2.1.2.3.1, 8a.2.1.2.3.3, 8a.2.1.3, 8a.2.1.3.2.1, 8a.2.1.3.2.2, 8a.2.1.3.3.2, 8a.2.1.3.4.2 |
|  |  |
|  | **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:*** |  |

\* \* \* Start of Change \* \* \* \*

###### 8a.2.1.2.2.2 Announcing UE procedure for UE-to-UE relay discovery initiation

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

a) the UE is authorised to act as a UE-to-UE relay in the PLMN indicated by the serving cell as specified in clause 5.2.x, and

1) the UE is served by NG-RAN and the UE is authorised to perform 5G ProSe direct discovery in the PLMN as specified in clause 5; or

2) the UE is authorised to perform 5G ProSe direct discovery when not served by NG-RAN as specified in clause 5 and intends to use the provisioned radio resources for UE-to-UE relay discovery; and

b) the UE is configured with:

1) the relay service code parameter identifying the connectivity service to be announced as specified in clause 5.2.x; and2) the User info ID for the UE-to-UE relay discovery parameter as specified in clause 5.2.x;

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

Figure 8a.2.1.2.2.2.1 illustrates the interaction of the UEs in the announcing UE procedure for UE-to-UE relay discovery.



Figure 8a.2.1.2.2.2.1: Announcing UE procedure for UE-to-UE relay discovery

When the UE is triggered by the upper layers to announce availability of a connectivity service provided by a UE-to-UE relay, if the UE is authorised to perform the announcing 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 or mobility registration 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 as specified in clause 11.2.5;

c) shall generate a PROSE PC5 DISCOVERY message for UE-to-UE relay discovery announcement according to clause 10.2.1. In the PROSE PC5 DISCOVERY message for UE-to-UE relay discovery announcement, the UE:

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

2) shall set the relay service code parameter to the relay service code configured for the connectivity service to be announced, as specified in clause 5.2.x;

3) may set the 5G ProSe end UE list to a list of user info ID(s) of the 5G ProSe end UE(s), if available, e.g. during previous 5G ProSe UE-to-UE relay discovery, 5G ProSe UE-to-UE relay communication or 5G ProSe direct discovery procedure(s);

4) shall include the MIC field computed as described in 3GPP TS 33.503 [34];5) shall set the UTC-based counter LSB parameter to the 4 least significant bits of the UTC-based counter;

6) shall set the Resource Status Indicator bit of the status indicator parameter to indicate whether or not the UE has resources available to provide a connectivity service for 5G ProSe UE-to-UE relay for additional ProSe-enabled UEs; and

7) shall set the ProSe direct discovery PC5 message type parameter as specified in table 10.2.1.12;

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

d) shall set the destination layer-2 ID to the default destination layer-2 ID as specified in clause 5.2.7 and self-assign a source layer-2 ID for sending the UE-to-UE relay discovery announcement; and

NOTE 1: 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 6.2.14.2.2.2, clause 6.2.15.2.2.2, clause 8.2.1.3.1.2 and clause 8a.2.1.3.1.2.

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

The UE shall ensure that it keeps on passing the same PROSE PC5 DISCOVERY message along with the same 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 until the UE is triggered by the upper layers to stop announcing availability of a connectivity service provided by a UE-to-UE relay, or until the UE stops being authorised to perform the announcing UE procedure for UE-to-UE relay discovery. How this is achieved is left up to UE implementation.

NOTE 2: The announcing UE can stop announcing 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.

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

###### 8a.2.1.2.3.1 General

The purpose of the monitoring UE procedure for UE-to-UE relay discovery is:

a) to enable a ProSe-enabled UE to become aware of proximity of a connectivity service provided by a UE-to-UE relay, upon a request from upper layers as defined in 3GPP TS 23.304 [2]; or

b) to enable a ProSe-enabled UE to perform measurements of signal strength of PROSE PC5 DISCOVERY messages from 5G ProSe UE-to-UE relay UE(s) for UE-to-UE relay selection/reselection.

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

###### 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.2.1.3.2.1 General

The purpose of the discoverer end UE procedure for UE-to-UE Relay discovery is:

a) to enable a ProSe-enabled UE to solicit proximity of a connectivity service provided by a UE-to-UE relay, upon a request from upper layers; or

b) to enable a ProSe-enabled UE to measure the PROSE PC5 DISCOVERY message signal strength between the ProSe-enabled UE and the 5G ProSe UE-to-UE relay UE(s) for UE-to-UE relay selection/reselection.

Editor's note: How to handle the case that the discoveree UE may be found by the discoverer UE directly (i.e. not via the 5G ProSe UE-to-UE relay UE) is FFS.

###### 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, as specified in clause 5.2.7; 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.x.

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, 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 as 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 UE-to-UE 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 user info ID of target discoveree end UE is not provided by upper layers for the connectivity service being solicited, or 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.2.1.3.3.2 Relay UE procedure for UE-to-UE relay discovery initiation

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

a) the UE is authorised to act as a 5G ProSe UE-to-UE relay UE in the PLMN indicated by the serving cell, and

1) the UE is served by NG-RAN; or

2) the UE is not served by NG-RAN and intends to use the provisioned radio resources for UE-to-UE relay discovery;

b) the UE is configured with:

1) the relay service code parameter identifying the connectivity service to be responded to as specified in clause 5.2.x; and

2) the User info ID for the UE-to-UE relay discovery parameter, as specified in clause 5.2.x.otherwise, the UE is not authorised to perform the relay UE procedure for UE-to-UE relay discovery.

When the UE is triggered by the upper layers to start responding to solicitation on proximity of a connectivity service provided by the UE-to-UE relay and if the UE is authorised to perform the relay 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 as specified in 3GPP TS 38.331 [13], shall perform a service request procedure as specified in 3GPP TS 24.501 [11]; and

b) shall instruct the lower layers to start monitoring for PROSE PC5 DISCOVERY messages.

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

NOTE 1: The UE can determine the received PROSE PC5 DISCOVERY message for 5G ProSe UE-to-UE relay discovery solicitation is for 5G ProSe direct discovery based on an indication from the lower layer.

Then, if:

a) the relay service code parameter of the received PROSE PC5 DISCOVERY message for UE-to-UE relay discovery solicitation is the same as the relay service code parameter configured as specified in clause 5.2.x for the connectivity service;

then the UE:

a) 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;

b) shall generate a PROSE PC5 DISCOVERY message for UE-to-UE relay discovery solicitation to the discoveree end UE. 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 source discoverer end UE info parameter of the PROSE PC5 DISCOVERY message for UE-to-UE relay discovery solicitation received from the discoverer end UE;

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

3) shall set the relay service code parameter to the relay service code parameter of the PROSE PC5 DISCOVERY message for UE-to-UE relay discovery solicitation received from the discoverer end UE;

4) shall set the Resource Status Indicator bit of the status indicator parameter to indicate whether or not the UE has resources available to provide a connectivity service for additional ProSe-enabled UEs;

5) shall set the target discoveree end UE info parameter to the target discoveree end UE info as received in the PROSE PC5 DISCOVERY message for UE-to-UE relay discovery solicitation from the discoverer end UE;

6) shall include the MIC filed computed as described in 3GPP TS 33.503 [34];

7) shall set the UTC-based counter LSB parameter to the 4 least significant bits of the UTC-based counter;

8) shall set the ProSe direct discovery PC5 message type parameter as specified in table 10.2.1.14;

c) 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 response 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 and is different from any other provisioned destination layer-2 ID(s) as specified in clause 5.2.

d) 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.

Figure 8a.2.1.3.3.2.1 illustrates the interactions between the 5G ProSe UE-to-UE relay UE and discoveree end UE in the relay UE procedure for UE-to-UE relay discovery.



Figure 8a.2.1.3.3.2.1: Relay UE procedure with the discoveree end UE for UE-to-UE Relay discovery

The UE shall instruct the lower layers to start monitoring for PROSE PC5 DISCOVERY messages for UE-to-UE relay discovery response from the discoveree end UE.

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 is not provided by the discoverer end UE for the connectivity service being solicited, or the discoveree end UE info parameter of the PROSE PC5 DISCOVERY message for UE-to-UE relay discovery response is the same as the target discoveree end UE info if the target discoveree end UE info parameter is included in the PROSE PC5 DISCOVERY message for UE-to-UE relay discovery solicitation,

then the UE:

a) 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;

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

1) shall set the target discoveree end UE info parameter to the target discoveree end UE info parameter of the PROSE PC5 DISCOVERY message for UE-to-UE relay discovery response received from the discoveree end UE;

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

3) shall set the source discoverer end UE info parameter to the source discoverer end UE info parameter of the PROSE PC5 DISCOVERY message for UE-to-UE relay discovery solicitation received from the 5G ProSe UE-to-UE relay UE;

4) shall set the relay service code parameter to the relay service code parameter of the PROSE PC5 DISCOVERY message for UE-to-UE relay discovery response received from the discoveree end UE;

5) shall set the Resource Status Indicator bit of the status indicator parameter to indicate whether or not the UE has resources available to provide a connectivity service for 5G ProSe UE-to-UE relay for additional ProSe-enabled UEs;

6) shall include the MIC filed computed as described in 3GPP TS 33.503 [34];

7) shall set the UTC-based counter LSB parameter to the 4 least significant bits of the UTC-based counter; and

8) shall set the ProSe direct discovery PC5 message type parameter as specified in table 10.2.1.14;

c) shall set the destination layer-2 ID to the source layer-2 ID from the discoverer end UE used in the transportation of the PROSE PC5 DISCOVERY message for UE-to-UE relay discovery solicitation and self-assign a source layer-2 ID for sending the UE-to-UE relay discovery response 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 and is different from any other provisioned destination layer-2 ID(s) as specified in clause 5.2.

d) shall pass the resulting PROSE PC5 DISCOVERY message for UE-to-UE relay discovery response 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.

NOTE 3: If the UE is processing a PROSE DIRECT LINK ESTABLISHMENT REQUEST message from the same source layer-2 ID of the received PROSE PC5 DISCOVERY message for UE-to-UE relay discovery solicitation, it depends on UE implementation to avoid the conflict of destination layer-2 ID (e.g. 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", or ignore the PROSE DIRECT DISCOVERY message for UE-to-UE relay discovery solicitation).

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

Figure 8a.2.1.3.3.2.2 illustrates the interactions between the 5G ProSe UE-to-UE relay UE and discoverer end UE in the relay UE procedure for UE-to-UE relay discovery.



Figure 8a.2.1.3.3.2.2: Relay UE procedure with the discoverer end UE for UE-to-UE Relay discovery

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

###### 8a.2.1.3.4.2 Discoveree end UE procedure for UE-to-UE relay discovery initiation

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

a) the UE is authorised to act as a 5G ProSe end UE in the PLMN indicated by the serving cell, and

1) the UE is served by NG-RAN; or

2) the UE is not served by NG-RAN and intends to use the provisioned radio resources for UE-to-UE relay discovery;

b) the UE is configured with:

1) the relay service code parameter identifying the connectivity service to be responded to as specified in clause 5.2.x; and2) the User info ID for the UE-to-UE relay discovery parameter, as specified in clause 5.2.x.

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

Figure 8a.2.1.3.4.2.1 illustrates the interaction of the UEs in the discoveree end UE procedure for UE-to-UE relay discovery.



Figure 8a.2.1.3.4.2.1: Discoveree end UE procedure for UE-to-UE Relay discovery

When the UE is triggered by the upper layers to start responding to solicitation on proximity of a connectivity service provided by a UE-to-UE Relay and if the UE is authorised to perform the discoveree 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 as specified in 3GPP TS 38.331 [13], shall perform a service request procedure as specified in 3GPP TS 24.501 [11]; and

b) shall instruct the lower layers to start monitoring for PROSE PC5 DISCOVERY messages.

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

NOTE 1: The UE can determine the received PROSE PC5 DISCOVERY message for 5G ProSe UE-to-UE relay discovery solicitation is for 5G ProSe direct discovery based on an indication from the lower layer.

Then, if:

a) the relay service code parameter of the received PROSE PC5 DISCOVERY message for UE-to-UE relay discovery solicitation is the same as the relay service code parameter configured as specified in clause 5.2.x for the connectivity service; and

b) the target discoveree end UE info parameter of the received PROSE PC5 DISCOVERY message for UE-to-UE relay discovery solicitation is the same as the user info ID for the UE-to-UE relay discovery configured in the UE as specified in clause 5.2.x;

then the UE:

a) 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;

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

1) shall set the target discoveree 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 source discoverer end UE info parameter to the source discoverer end UE info parameter of the PROSE PC5 DISCOVERY message for UE-to-UE relay discovery solicitation received from the 5G ProSe UE-to-UE relay UE;

3) shall set the relay service code parameter to the relay service code parameter of the PROSE PC5 DISCOVERY message for UE-to-UE relay discovery solicitation;

4) shall set the ProSe direct discovery PC5 message type parameter as specified in table 10.2.1.14;

c) shall set the destination layer-2 ID to the source layer-2 ID from the 5G ProSe UE-to-UE relay UE used in the transportation of the PROSE PC5 DISCOVERY message for UE-to-UE relay discovery solicitation and self-assign a source layer-2 ID for sending the UE-to-UE relay discovery response 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 and is different from any other provisioned destination layer-2 ID(s) as specified in clause 5.2.

d) shall pass the resulting PROSE PC5 DISCOVERY message for UE-to-UE relay discovery response 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.

NOTE 3: If the UE is processing a PROSE DIRECT LINK ESTABLISHMENT REQUEST message from the same source layer-2 ID of the received PROSE PC5 DISCOVERY message for UE-to-UE relay discovery solicitation, it depends on UE implementation to avoid the conflict of destination layer-2 ID (e.g. 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", or ignore the PROSE DIRECT DISCOVERY message for UE-to-UE relay discovery solicitation).

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

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