**3GPP TSG-CT WG1 Meeting #135-eC1-222746**

**E-Meeting, 6th – 12th April 2022**

**Source: vivo**

**Title: Discussion on using** **configuration information provisioned in the UICC or ME for 5G ProSe direct discovery over PC5**

**Agenda item: 17.2.18**

**Document for: DISCUSSION**

1. Introduction

TS 23.304 [2] has specified the 5G ProSe direct discovery procedure over PC5, which is defined as the process that detects and identifies another UE in proximity via PC5 reference point. The 5G ProSe direct discovery procedure over PC5 can be standalone or used for subsequent actions e.g. to initiate 5G ProSe direct communication.

When analyzing the work performed by CT1 in 3GPP TS 24.554 [1] and the stage 2 detailed work on 5G ProSe direct discovery over PC5 in TS 23.304 [2], it seems that there are some issues regarding the UE fails to obtain a ProSe application code, ProSe restricted code, ProSe query code, or ProSe response code before initiating the 5G ProSe direct discovery procedure over PC5.

2. Discussion

There are two models defined for 5G ProSe direct discovery; model A and mode B. The model A uses a single discovery protocol message (announcement) while the model B uses two discovery protocol messages (solicitation and response).

For model A, the initiating UE **shall include** ProSe application code (in open 5G ProSe direct discovery) or ProSe restricted code (in restricted 5G ProSe direct discovery) for announcing. For model B, the initiating UE **shall include** ProSe query code for solicitation (model B), and the discoverer UE should include ProSe response code for responding.

See below:

Quote of clause 6.2.14.2.1.2 (Announcing UE procedure) in 3GPP TS 24.554 [1]:

*c) shall generate a PROSE PC5 DISCOVERY message for 5G ProSe direct discovery announcement if the resulting UTC-based counter is within the max offset of the time shown by the clock used for ProSe by the UE and if the timer T5060 or T5062 does not expire. In the* *PROSE PC5 DISCOVERY message for direct discovery announcement, the UE:*

*1) shall set the ProSe direct discovery PC5 message type parameter as specified in table 10.2.1.1 or table 10.2.1.2;*

*2)* *shall include either ProSe application code or ProSe restricted code;*

[…]

Quote of clause 6.2.14.2.2.2 (Discoverer UE procedure) in 3GPP TS 24.554 [1]:

*c) shall generate a PROSE PC5 DISCOVERY message for 5G ProSe direct discovery solicitation. In the PROSE PC5 DISCOVERY message for 5G ProSe direct discovery solicitation, the UE:*

*1) shall set the ProSe direct discovery PC5 message type parameter as specified in table 10.2.1.3;*

*2) shall include* *ProSe query code;*

[…]

For the convenience of discussion, the rest of this paper will use ***direct discovery code*** to represent one or more of the following codes for direct discovery over PC5: ProSe application code, ProSe restricted code, ProSe query code, or ProSe response code.

To obtain one or more direct discovery code(s), the UE shall initiate announce request procedure, discoveree request procedure, or discoverer request procedure as defined in clause 6.2 of TS 24.554 [1] to interact with 5G DDNMF. However, there are some scenarios that the UE fails to obtain direct discovery code(s).

**Scenario** **A): The initiating UE failed to obtain direct discovery code when losing NG-RAN coverage**

TS 24.554 has specified that if the transmission of DISCOVERY\_REQUEST message is failed or the UE does not successfully receive any response from DDNMF, the UE should restart e.g. the announce request procedure:

Quote of clause 6.2.3.6.2 in 3GPP TS 24.554 [1]:

*The following abnormal cases can be identified:*

*a) Indication from the transport layer of transmission failure of DISCOVERY\_REQUEST message (e.g., after TCP retransmission timeout)*

*The UE shall close the existing secure connection to the 5G DDNMF, establish a new secure connection and then restart the announce request procedure.*

*b) No response from the 5G DDNMF after the DISCOVERY\_REQUEST message has been successfully delivered (e.g., TCP ACK has been received for the DISCOVERY\_REQUEST message)*

*The UE shall retransmit the DISCOVERY\_REQUEST message.*

*NOTE: The timer to trigger retransmission and the maximum number of allowed retransmissions are UE implementation specific.*

[…]

However, stage-2 spec TS 23.304 [2] states that:

Quote of clause 6.3.1.1 in 3GPP TS 23.304 [2]:

*ProSe-enabled UEs which have obtained authorization to participate in 5G ProSe Direct Discovery shall not continue in participating in 5G ProSe Direct Discovery procedures over PC3a reference point defined in clause 6.3.1 when they detect loss of NG-RAN coverage in the serving PLMN.*

According to the specification above, in the following cases of Scenario A):

(1) the UE has successfully initiated the DISCOVERY\_REQUEST message but fails to receive the response message because the UE has lost the NG-RAN coverage;

(2) the UE has not successfully sent the DISCOVERY\_REQUEST message because it is not in the NG-RAN coverage; or

(3) the UE has not successfully sent the DISCOVERY\_REQUEST message due to any other reasons,

the UE will try a UE implementation specific maximum number of allowed retransmissions and then stop participating in 5G ProSe direct discovery procedures over PC3a in case (3), or does not re-sent DISCOVERY\_REQUEST message in case (1) and (2).

**Proposal-1: TS 24.554 should clarify the different UE behaviors if the transmission of DISCOVERY\_REQUEST message is failed or the UE does not successfully receive any response from DDNMF when UE is not in coverage.**

Please note that, if it is the first time the UE trying to request direct discovery code, the UE would fail to obtain any direct discovery code. Hence the UE would fail to perform direct discovery procedure over PC5 because it does not have any direct discovery code. However, stage-2 requirements in TS 23.304 [2] states that, the UE can use valid authorization parameters in UICC or ME to perform 5G ProSe direct discovery over PC5:

*5.1.1 General*

*In 5GS, the parameters for 5G ProSe Direct Discovery, 5G ProSe Direct Communication, and 5G ProSe UE-to-Network Relay service may be made available to the UE in following ways:*

*- provisioned in the ME; or*

*- configured in the UICC; or*

*- provisioned in the ME and configured in the UICC; or*

*- provided or updated by the ProSe Application Server via PCF and/or PC1 reference point; or*

*- provided or updated by the PCF to the UE.*

The above stage-2 requirement is also reflected in TS 24.554[1], e.g.:

Quote of clause 6.2.14.2.1.2 in 3GPP TS 24.554 [1]:

*The UE* *is authorised to perform the announcing UE procedure for 5G ProSe direct discovery if:*

*a) the UE is not served by NG-RAN, is authorised to perform 5G ProSe direct discovery using announcing procedure 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;*

*b) the UE is served by NG-RAN, and is authorised to perform 5G ProSe direct discovery using announcing in the PLMN indicated by the serving cell; or*

[…]

Hence, how to use configuration information provisioned in the UICC or ME for 5G ProSe direct discovery over PC5 should be clarified by stage-2.

**Scenario** **B): The initiating UE does not have valid PCF or application provisioned parameters.**

However, the initiating UE may not have valid PCF or application provisioned parameters, this may happen when the UE:

(1) the valid timer of provisioned parameters from PCF expires and UE does not connect to 5GS to update the policy;

(2) is in 5GMM-DEREGISTERED state and clear the provisioned parameters from the last PLMN; or

(3) wants to perform a ProSe service via the configuration information configured in the UICC because it can not register to the network (e.g. not in NG-RAN coverage),

According to clause 5.2.2 of TS 24.554 [1], the UE would use the configuration information configured in the UICC to perform a 5G ProSe direct discovery procedure over PC5. However, the direct discovery code(s) are managed by 5G DDNMF, and the UE can not obtain any direct discovery code from the pre-configuration policy/parameters as defined in clause 5.2.3 of TS 24.554 [1]. Hence the UE would fail to perform the 5G ProSe direct discovery procedure using the configuration information configured in the UICC.

Hence, how to use configuration information provisioned in the UICC or ME for 5G ProSe direct discovery over PC5 should be clarified by stage-2.

**Proposal-2: Send a LS to SA2 to clarify whether and how to enable 5G ProSe direct discovery over PC5 using configuration information provisioned in the UICC or ME.**

3. Conclusion

In the current design, the ProSe application code, ProSe restricted code, ProSe query code, and ProSe response code for 5G ProSe direct discovery over PC5 are managed by 5G DDNMF, and are not included in the provisioned policy/parameters to the UE. Stage-2 should clarify how to enable the 5G ProSe direct discovery procedure over PC5 using valid authorization parameters in UICC or ME.

Hence, the author of this paper proposes:

**Proposal-1: TS 24.554 should clarify the different UE behaviors if the transmission of DISCOVERY\_REQUEST message is failed or the UE does not successfully receive any response from DDNMF when UE is not in coverage.**

**Proposal-2: Send a LS to SA2 to clarify whether and how to enable 5G ProSe direct discovery over PC5 using configuration information provisioned in the UICC or ME.**

wherein, a draft CR to clarify UE behaviors when out of courage can refer to C1-222750, and a draft LS to SA2 can refer to C1-222745.

# References

[1] 3GPP TS 24.554: "Proximity-services (ProSe) in 5G System (5GS) protocol aspects; Stage 3"

[2] 3GPP TS 23.304: "Proximity based Services (ProSe) in the 5G System (5GS); Stage 2"