**3GPP TSG-SA3 Meeting #119 *S3-244962***

Orlando, US, 11th - 15th November 2024

**Source: Qualcomm Incorporated**

**Title: Addressing Ens in solution #16**

**Document for: Approval**

**Agenda Item: 5.12**

# 1 Decision/action requested

***This contribution proposes to address Editor’s Notes in solution#16.***

# 2 References

[1] TS 23.304

[2] TR 33.743

# 3 Rationale

This contribution proposes to address the Editor’s Notes in solution #16.

First, the Remote UE report procedure defined in clause 6.4.3.8.1 of TS 23.304 [1] uses a link modification procedure to inform the parent relay of child relay(s) or the Remote UE(s)’s User Info. This procedure is performed after per-hop PC5 links are established among Remote UE, Intermediate U2N relays and root U2N relay in the path. Since the scope of this solution is per-hop PC5 link security establishments, Remote UE report procedure is out of scope of this solution. Therefore, it is proposed to remove the following Editor’s Note.

Editor’s Note: How the Remote UE report defined in SA2 is supported in this solution is FFS.

Second, as clarified above, this solution describes how to perform a PC5 link security establishment for each hop among Remote UE, Intermediate U2N relays and root U2N relay in the path. The Remote UE and its upstream intermediate U2N relay are authenticated and authorized by network during PC5 link security establishment procedure. However, the authentication and authorization between Remote UE and root U2N relay are not the scope of this solution. Therefore, it is proposed to remove the following Editor’s Note.

Editor’s Note: It is FFS how authentication and authorization between Remote UE and U2N is performed.

Since all remaining Editor’s Notes are addressed as above, it is proposed to remove the below Editor’s Note in the evaluation.

Editor’s Note: Further evaluation is FFS.

# 4 Detailed proposal

It is proposed that SA3 approved the below changes for inclusion in the draft TR [2].

**\*\*\*\* START OF CHANGES \*\*\*\***

## 6.16 Solution #16: Multi-hop UE-to-Network Relay communication security after discovery with Model B

### 6.16.1 Introduction

This solution addresses the first, second and third security requirements in the key issue #1 regarding the multi-hop UE-to-Network (U2N) Relay communication. This solution proposes to reuse the security procedure over User Plane for PC5 security establishment for each hop among 5G ProSe Remote UE, Intermediate UE-to-Network Relay(s), and 5G ProSe UE-to-Network Relay as specified in clause 6.3.3.2 of TS 33.503 [5] after muti-hop U2N relay discovery with Model B. To this end, once an Intermediate UE-to-Network Relay receives a Direct Communication Request from a 5G ProSe Remote UE, it first performs the security procedure over User Plane for PC5 security establishment with the selected 5G ProSe UE-to-Network Relay based on the received path information. Then, the Intermediate UE-to-Network Relay continues the PC5 security establishment with the 5G ProSe Remote UE over user plane.

### 6.16.2 Solution details

The security procedure for multi-hop UE-to-Network Relay communication is shown in Figure 6.16.2-1.

Figure 6.16.2-1: Security procedure for multi-hop UE-to-Network Relay communication

0. The 5G ProSe Remote UE, Intermediate UE-to-Network Relay, and 5G ProSe UE-to-Network Relay are provisioned with the discovery security materials associated with an RSC based on the procedure specified in clause 6.3 of TS 33.503 [5]. In addition, the 5G ProSe Remote UE and Intermediate UE-to-Network Relay are provisioned with UP-PRUK and UP-PRUK ID from 5G PKMF as specified in step 1 in clause 6.3.3.2.2 of TS 33.503 [5].

1. The 5G ProSe Remote UE performs a multi-hop UE-to-Network Relay discovery with Model B procedure with the Intermediate UE-to-Network Relay and 5G ProSe UE-to-Network Relay.

2. After multi-hop UE-to-Network Relay discovery procedure, the 5G ProSe Remote UE initiates PC5 security establishment for 5G ProSe UE-to-Network relay communication over User Plane with the Intermediate UE-to-Network Relay by sending Direct Communication Request message.

3. If the Intermediate UE-to-Network Relay does not have an existing PC5 link with the selected 5G ProSe UE-to-Network Relay or an Intermediate UE-to-Network relay on the path to the 5G ProSe UE-to-Network Relay, the Intermediate UE-to-Network Relay establishes a PC5 link with the 5G ProSe UE-to-Network Relay or the intermediate UE-to-Network relay based on the PC5 security establishment for 5G ProSe UE-to-Network relay communication over User Plane specified in clause 6.3.3.2.2 of TS 33.503 [5].

4. The Intermediate UE-to-Network Relay, then, performs the Key Request/Response procedure with the 5G PKMF/DDNMF of Intermediate UE-to-Network Relay using the parameters received in step 2.

NOTE 1: It is assumed that an Intermediate UE-to-Network Relay is able to access to the 5G PKMF of its HPLMN.

5. The Intermediate UE-to-Network Relay performs Direct Security Mode Command procedure with the 5G ProSe Remote UE and completes the PC5 security establishment with the rest of procedures.

### 6.16.3 Evaluation

This solution addresses the security requirements in the key issue #1 regarding the multi-hop UE-to-Network (U2N) Relay communication by reusing the security procedure over use plane for single-hop 5G ProSe U2N Relay communication.

This solution assumes that hop-by-hop PC5 links among Remote UE, Intermediate U2N Relay, and U2N Relay are established after discovery with Model B, which is aligned with the conclusion in TR 23.700-03 [1].

Since the scope of this solution is per-hop PC5 link security establishments, Remote UE report procedure after PC5 links establishments is out of scope of this solution.

This solution describes how to perform a PC5 link security establishment for each hop among Remote UE, Intermediate U2N relays and root U2N relay in the path. The Remote UE and its upstream intermediate U2N relay are authenticated and authorized by network during PC5 link security establishment procedure. The direct authentication and authorization between Remote UE and root U2N relay are not the scope of this solution

**\*\*\*\* END OF CHANGES \*\*\*\***