**3GPP TSG-SA3 Meeting #116 *S3-242154-r1***

Jeju, Korea, 20th – 24th May 2024

**Source: Qualcomm Incorporated**

**Title: A new solution for multi-hop U2N relay communication security**

**Document for: Approval**

**Agenda Item: 5.12**

# 1 Decision/action requested

***This contribution proposes a new solution to address the key issue #1.***

# 2 References

[1] Draft TR 33.743 v0.1.0

# 3 Rationale

This contribution proposes a new solution for multi-hop UE-to-Network Relay communication security.

# 4 Detailed proposal

It is proposed that SA3 approved the below changes for inclusion in the draft TR [1].

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

## 6.Y Solution #Y: Multi-hop UE-to-Network Relay communication security

### 6.Y.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]. The proposed security procedure is based on the multi-hop UE-to-Network Relay communication procedures in the solutions (i.e., solution #1, #2, and #7) of TR 23.700-03 [1].

### 6.Y.2 Solution details

The security procedure for multi-hop UE-to-Network Relay communication is shown in Figure 6.Y.2-1.



Figure 6.Y.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 procedure with the Intermediate UE-to-Network Relay and 5G ProSe UE-to-Network Relay.

2. If the Intermediate UE-to-Network Relay does not have an existing PC5 link with the 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].

Editor’s Note: How to trigger the PC5 Link establishment with security is FFS.3. The 5G ProSe Remote UE establishes a PC5 link with 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] with the Intermediate UE-to-Network Relay taking the role of the 5G ProSe UE-to-Network Relay.

NOTE 1: step 3 can start before step 2.

Editor’s Note: How the Intermediate Relay decides to connect to U2N Relay without connection request from Remote UE is FFS.

Editor’s Note: How the Intermediate Relay can play the role of U2N Relay to perform UP procedure while out of coverage is FFS.

Editor’s Note: How is the Remote UE authorized for connecting via U2N Relay as per UP procedure is FFS.

Editor’s Note: The need for a Remote UE to establish e2e security with the U2N relay is FFS.

Editor’s Note: Alignment with SA2 conclusion on the procedures is FFS.

### 6.Y.3 Evaluation

TBD

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