**3GPP TSG-SA3 Meeting #109AdHoc-e *draft\_S3-230268-r1***

**Electronic meeting, 16 - 20 January 2023**

**Source: Philips International B.V.**

**Title: Evaluation Solution #15**

**Document for: Approval**

**Agenda Item: 5.3**

# 1 Decision/action requested

***This Tdoc proposes editorial changes and evaluation of Sol#15 in TR 33.740.***

# 2 References

# 3 Rationale

*Regarding the Editor’s Note: “Its FFS why the source UE cannot select in-coverage solution if UE-to-UE relay is in-coverage” The source UE can select an in-coverage solution, but it might also prefer to select an out-of-coverage solution, even if the UE-to-UE relay is in-coverage, when:*

1. *the keying materials associated have expired,*
2. *local operation is preferred, e.g., for performance reasons or,*
3. *based on application preferences.*

*Thus, we propose to remove the Editor’s Note.*

*Regarding two Editor’s Notes in the evaluation:*

*“Editor’s Note: Details about the policy to choose In-Coverage or Out-of-Coverage mechanisms is FFS.”, and*

*“Editor’s Note: Further evaluation is FFS.”*

*The following text is proposed:*

*The signalling and agreement logic may be carried out during the direct communication establishment, as described in this solution, or in the discovery phase so that the 5G ProSe Source/Target and UE-to-UE relay can choose between the In-Coverage dedicated mechanism and the Out-of-Coverage dedicated mechanism before starting the direct communication establishment.*

*This solution requires a policy, to choose In-Coverage or Out-of-Coverage. This policy might include:*

* *Which of the supported solutions or solution parameters are preferred when in-coverage and/or when out-of-coverage.*
* *Whether/how security parameters (e.g., a password, or a key, etc) of an out-of-coverage solution may be entered when devices are out-of-coverage.*
* *Which U2U relay is preferred in case multiple U2U relays are available depending on e.g., coverage situations of U2U and/or Source and/or Target UE.*
* *Prioritization and behaviour of Source UE or U2U relay in case e.g., Source-UE initiates multiple security associations (e.g., with multiple DCR messages), using the same or different (types of) solutions, e.g., after a failed association.*

# 4 Detailed proposal

\*\*\* Start changes \*\*\*

## 6.15 Solution #15: Selection and authorization of in-coverage and out-of-coverage authentication and key establishment

### 6.15.1 Introduction

This solution addresses Key Issue #2 and Key Issue #3.

Different types of solutions and configurations may be available to establish a secure and authorized PC5 communication link. For instance, Solution #3 and #5 address in-coverage scenarios while Solution #4, #6 and #7 address out-of-coverage scenarios, and Solution #10 may be used in both in-coverage and out-of-coverage.

Since more than a single solution might be needed to address different scenarios, it is required to determine which solution is allowed to be used when. For instance, an out-of-coverage source UE might attempt to use a solution for out-of-coverage when the UE-to-UE relay is in-coverage. In this exemplary situation, the UE-to-UE relay should be able to determine, based on a policy, that an in-coverage solution is (not) required and indicate this to the source UE.

This solution describes the configuration of a policy that allows source/target Ues and UE-to-UE relay to agree on the type of solution and parameters that is preferred and/or authorized to be used.

### 6.15.2 Solution details

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**Figure 6.15.2-1**

The message flow and steps of this solution are as outlined in Figure 6.15.2-1.

* In Step 0, the Ues perform an initial authorization and parameter provisioning for in-coverage and out-of-coverage situations. This step includes the configuration of parameters for different solutions for in-coverage and out-of-coverage security establishment and authorization.

Note 1: the configured parameters for in-coverage and out-of-coverage solution depend on the configured solution.

* In Step 1, the source UE and UE-to-UE relay perform a discovery phase.
* In Step 2, the source UE determines its out-of-coverage (in-coverage) situation, and choses a security solution and/or security parameters for its out-of-coverage (in-coverage) situation. This choice can be based on multiple reasons, e.g., application requirements such as performance or an in-coverage (out-of-coverage) indication received from the UE-to-UE relay during discovery, etc. The source UE builds correspondingly a Direct Communication Request based on the chosen out-of-coverage (in-coverage) solution and security parameters.
* In Step 3, the UE-to-UE relay receives the DCR message and determines whether the DCR message either implicitly or explicitly contains parameters for an out-of-coverage (in-coverage) solution. The UE-to-UE relay then checks that the requested solution and security parameters fit its out-of-coverage (in-coverage) situation and whether a policy deployed in Step 0 together with any authorization information received in Step 2 allow the usage of said solution and security parameters. Once this policy is evaluated and if the result is positive, the UE-to-UE relay will proceed executing the requested out-of-coverage (in-coverage) solution. Alternatively, if the result is negative, the UE-to-UE relay may – based on configuration – indicate the source UE policy mismatch, and potentially request a different DCR message including a requested solution and security parameters.
* In Step 4, the UE-to-UE relay may take one of the following alternative steps:
  + Step 4-A, send a message to the Source UE to go on with an in-coverage solution.
  + Step 4-B, send a message to the core network to go on with an out-coverage solution.
  + Step 4-C, send a message to the Source UE indicating that the security establishment based on the exchanged parameters is not feasible and requesting alternative parameters.

Note 2: The above steps can be repeated for the security establishment process and authorization between Target UE and UE-to-UE relay.

Note 3: The above process illustrates how Ues signal and agree on solution and security parameters to use by means of the DCR message. This signalling and agreement phase might also be carried out in the discovery phase.

### 6.15.3 Evaluation

This solution coordinates the selection and authorization of in-coverage and out-of-coverage authentication and key establishment procedures, and thus, supports Key Issue #2 and Key Issue #3.

This solution allows the Ues (Source/Target/Relay) to support multiple security methods (i.e. for In-Coverage and Out-of-Coverage). Ues are required to support both In-Coverage and Out-of-Coverage mechanisms if they intend to work under both scenarios. The 5G ProSe Source/Target and UE-to-UE relay need to have the logic and a new policy to choose between the In-Coverage dedicated mechanism and the Out-of-Coverage dedicated mechanism before/during the direct communication establishment procedures.

\*\*\* End changes \*\*\*