**3GPP TSG-CT WG1 Meeting #124-eC1-20XXXX**

**Electronic meeting, 2-10 June 2020**

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| *CR-Form-v12.0* |
| **CHANGE REQUEST** |
|  |
|  | **24.502** | **CR** | **0135** | **rev** | **1** | **Current version:** | **16.3.0** |  |
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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 | **X** |

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| ***Title:***  | Correction of TNGF procedure |
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| ***Source to WG:*** | Motorola Mobility, Lenovo |
| ***Source to TSG:*** | C1 |
|  |  |
| ***Work item code:*** | 5WWC |  | ***Date:*** | 2020-06-02 |
|  |  |  |  |  |
| ***Category:*** | **F** |  | ***Release:*** | Rel-16 |
|  | *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-12 (Release 12)**Rel-13 (Release 13)Rel-14 (Release 14)Rel-15 (Release 15)Rel-16 (Release 16)* |
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| ***Reason for change:*** | SA WG2 Meeting #138E agreed that the TNGF shall send the access network parameters (such as TNGF IPv4 contact information, TNGF IPv6 contact information, or both) to UE only after the TNGF receives the TNGF key. This modification should be reflected into TS 24.502. |
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| ***Summary of change:*** | Specify that the TNGF sends the network access parameters to the UE according to stage 2 by:* adding text for the procedure that the TNGF provides the UE, AN parameters by an EAP-Request/5G-Notification message and the UE acknowledges that by an EAP-Response/5G-Notification message.
* definning EAP-Request/5G-Notification and EAP-Response/5G-Notification messages.
* removing the AN parameters from EAP-Request/5G-NAS message
* modified figure 7.3A.1-1 to include EAP-Request/5G-Notification message and EAP-Response/5G-Notification message
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| ***Consequences if not approved:*** | If the AMF decides to skip the authentication procedure and the security mode control procedure (e.g. because the UE has already a valid NAS security context), the TNGF address cannot be sent to UE and the registration fails. |
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| ***Clauses affected:*** | 7.3A.1, 7.3A.2.3, 7.3A.2.4, 7.3A.3.1, 9.3.2.2.3, (new) 9.3.2.2.X, (new) 9.3.2.2.Y |
|  |  |
|  | **Y** | **N** |  |  |
| ***Other specs*** | **X** |  |  Other core specifications  | TS 23.502 CR 2293  |
| ***affected:*** |  | **X** |  Test specifications | TS/TR ... CR ...  |
| ***(show related CRs)*** |  | **X** |  O&M Specifications | TS/TR ... CR ...  |
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| ***Other comments:*** |  |
|  |  |
| ***This CR's revision history:*** |  |

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

### 7.3A.1 General

A trusted non-3GPP access network (TNAN) includes a trusted non-3GPP access point (TNAP) and a trusted non-3GPP gateway function (TNGF). The TNAN and a UE initiate an exchange of EAP-Request and EAP-Response messages including Identity as specified in IETF RFC 3748 [9] for link layer authentication of the UE by the TNAP. Upon completion of the EAP-Request/Response messages, an exchange of the EAP-5G messages are initiated once the UE receives an EAP-Request/5G-Start from the TNGF. The UE also at that time informs the upper layers that the access stratum connection is established.

An exchange of the NAS messages which are encapsulated in EAP-5G messages occur until the UE is authenticated by the 5GCN. Upon completion of the UE authentication and reception of the EAP-Success by the UE, the UE and the TNAP employs the TNAP key to establish access specific layer-2 security such as 4-way handshake in case IEEE 802.11 [19] is used between the TNAP and the UE.

Upon completion of successful establishment of access specific layer-2 security, the UE is configured with an IP address by TNAN by e.g. DHCP and the UE initiates an IKE\_SA\_INIT exchange as specified in IETF RFC 7296 [6].

The UE establishes the IP based secure connection by establishing an IKE SA and first child SA for NAS signalling traffic to the TNGF over NWt. Once the UE establishes the IKE SA and the signalling IPsec SA with the TNGF, the UE initiates establishment of a TCP connection for transport of NAS message with TNGF, secured using the signalling IPsec SA. The UE and the TNGF exchanges NAS messages over the TCP connection once it is established. Additional child SAs (user plane IPsec SAs) can be established to transfer user plane traffic (see subclause 7.5).

An example of an IKE SA and first child SA establishment procedure is shown in figure 7.3A.1-1.The figure illustrates that EAP messages are employed for the communication between the UE and the TNAP while the TNAP is transparent to the communication between the UE and the TNGF when employing EAP-5G messages. Link layer protocol is used to exchange these messages between the UE and the TNAN. The internal protocol used for the communications between the TNAP and the TNGF, is illustrated as dashed lines in this figure and is out of the scope of 3GPP.

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Figure 7.3A.1-1: IKE SA and first child SA establishment procedure for UE registration over trusted non-3GPP access

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#### 7.3A.2.3 EAP-5G session initiation

The UE and the TNGF shall exchange EAP-5G messages. The TNGF on reception of the NAI by TNAP and passed on to TNGF, shall initiate EAP-5G session by sending an EAP-Request/5G-Start message. Upon reception of an EAP-Request/5G-Start message, the UE shall send an EAP-Response/5G-NAS message encapsulated in link layer protocol packets. In the EAP-Response/5G-NAS message, the UE shall include:

a) a NAS-PDU field containing a NAS message, for example, a REGISTRATION REQUEST message; and

b) an AN-parameters field containing access network parameters, such as GUAMI, selected PLMN ID, S-NSSAI and establishment cause, see 3GPP TS 23.502 [3].

The TNGF on reception of EAP-Response/5G-NAS message, forwards the NAS message to the AMF.

NOTE: The TNGF is transparent to the NAS messages and as an intermediate network entity only conveys transparently the NAS messages to the AMF.

The TNAN, on reception of the NAS messages from the AMF, shall send an EAP-Request/5G-NAS message encapsulated in the link layer protocol packets towards the UE via the TNAP. The EAP-Request/5G-NAS message shall include a NAS-PDU field that contains a NAS message. Further NAS messages between the UE and the AMF, via the TNGF, shall be inserted in NAS-PDU field of an EAP-Response/5G-NAS (UE to TNGF direction) and EAP-Request/5G-NAS (TNGF to UE direction) message.

The UE, on reception of the EAP-Request/5G-NAS message including a NAS-PDU field containing a NAS message e.g. for security establishment, shall send a response with EAP-Response/5G-NAS message including a NAS-PDU field containing a NAS message related to the NAS security context to the TNGF.

The TNGF, on reception of the TNGF key shall construct an EAP-Request/5G-Notification message that includes an AN-parameters field containing the access network parameters, such as TNGF IPv4 contact information, TNGF IPv6 contact information, or both, see 3GPP TS 23.502 [3]. The TNGF shall send the EAP-Request/5G-Notification message encapsulated in the link layer protocol packets towards the UE via the TNAP. The UE shall acknowledge by sending an EAP-Response/5G-Notification message encapsulated in the link layer protocol packets.

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#### 7.3A.2.4 EAP-5G session completion initiated by the network

Upon completion of successful authentication and on reception of the acknowledgement from the UE that it had received the access network parameters, the TNAN shall send an EAP-Success message encapsulated in the link layer protocol packets towards the UE via the TNAP.

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

#### 7.3A.3.1 IKE SA and signalling IPsec SA establishment initiation

In a trusted non-3GPP access network, once the EAP- 5G authentication is successfully complete and the UE is configured with a local IP address, the UE shall use the TNGF IP address received in the EAP-Request/5G-Notification message (see subclause 7.3A.2.3) to establish a secure connection between the UE and the TNGF over NWt to exchange NAS signalling messages with the AMF. The UE shall establish the secure connection by establishing an IKE SA and signalling IPsec SA (first child SA) by initiating the IKE\_SA\_INIT exchange and then IKE\_AUTH exchange for mutual authentication with the TNGF and NULL encryption as specified in IETF RFC 2410 [34]. The UE shall set the IDi payload of the IKE\_AUTH request message in the IKE\_AUTH exchange (see IETF RFC 7296 [6]) to the NAI as specified in subclause 28.7.3 of 3GPP TS 23.003 [8].

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##### 9.3.2.2.3 EAP-Request/5G-NAS message

EAP-Request/5G-NAS message is coded as specified in figure 9.3.2.2.3-1, figure 9.3.2.2.3-2, and figure 9.3.2.2.3-3 and table 9.3.2.2.3-1, table 9.3.2.2.3-2, and table 9.3.2.2.3-3.

|  |  |
| --- | --- |
| Bits |  |
| 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 | Octets |
| Code | 1 |
| Identifier | 2 |
| Length | 3 - 4 |
| Type | 5 |
| Vendor-Id | 6 - 8 |
| Vendor-Type | 9 - 12 |
| Message-Id | 13 |
| Spare | 14 |
| NAS-PDU length | 15 - 16 |
| NAS-PDU  | 17 - n |
|  |  |
|  |  |
| Extensions | n+1 - z |

Figure 9.3.2.2.3-1: EAP-Request/5G-NAS message

Table 9.3.2.2.3-1: EAP-Request/5G-NAS message

|  |
| --- |
| Code field is set to 1 (decimal) as specified in IETF RFC 3748 [9] subclause 4.1 and indicates request. |
| Identifier field is set as specified in IETF RFC 3748 [9] subclause 4.1. |
| Length field is set as specified in IETF RFC 3748 [9] subclause 4.1 and indicates the length of the EAP-Request/5G-NAS message in octets. |
| Type field is set to 254 (decimal) as specified in IETF RFC 3748 [9] subclause 5.7 and indicates the expanded type. |
| Vendor-Id field is set to the 3GPP Vendor-Id of 10415 (decimal) registered with IANA under the SMI Private Enterprise Code registry. |
| Vendor-Type field is set to EAP-5G method identifier of 3 (decimal) as specified in 3GPP TS 33.402 [10] annex C. |
| Message-Id field is set to 5G-NAS-Id of 2 (decimal). |
| Spare field consists of spare bits. |
| NAS-PDU length field indicates the length of NAS-PDU field in octets. |
| NAS-PDU field contains a NAS message from the AMF as specified 3GPP TS 24.501 [4]. |
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| Extensions field is an optional field and consists of spare bits. |

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##### 9.3.2.2.X EAP-Request/5G-Notification message

EAP-Request/5G-Notification message is coded as specified in figure 9.3.2.2.X-1 and table 9.3.2.2.X-1.

|  |  |
| --- | --- |
| Bits |  |
| 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 | Octets |
| Code | 1 |
| Identifier | 2 |
| Length | 3 - 4 |
| Type | 5 |
| Vendor-Id | 6 - 8 |
| Vendor-Type | 9 - 12 |
| Message-Id | 13 |
| Spare | 14 |
| AN-parameters length | 15 - 16 |
| AN-parameters | 17 – n |
| Extensions | n+1 - m |

Figure 9.3.2.2.X-1: EAP-Request/5G-Notification message

Table 9.3.2.2.X-1: EAP-Request/5G-Notification message

|  |
| --- |
| Code field is set to 1 (decimal) as specified in IETF RFC 3748 [9] subclause 4.1 and indicates request. |
| Identifier field is set as specified in IETF RFC 3748 [9] subclause 4.1. |
| Length field is set as specified in IETF RFC 3748 [9] subclause 4.1 and indicates the length of the EAP-Request/5G-Notification message in octets. |
| Type field is set to 254 (decimal) as specified in IETF RFC 3748 [9] subclause 5.7 and indicates the expanded type. |
| Vendor-Id field is set to the 3GPP Vendor-Id of 10415 (decimal) registered with IANA under the SMI Private Enterprise Code registry. |
| Vendor-Type field is set to EAP-5G method identifier of 3 (decimal) as specified in 3GPP TS 33.402 [10] annex C. |
| Message-Id field is set to 5G-Notification-Id of 3 (decimal). |
| Spare field consists of spare bits. |
| AN-parameters length indicates the length of the AN-parameters field in octets |
| AN-Parameters field is coded according to figure 9.3.2.2.X-2 and table 9.3.2.2.X-2. |
| Extensions field is an optional field and consists of spare bits. |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |  |
| AN-parameter 1 | octet 17octet a |
| AN-parameter 2 | octet a+1octet b |
| ... | octet b+1octet k |
| AN-parameter n | octet k+1octet n |

Figure 9.3.2.2.X-2: AN-parameters field

Table 9.3.2.2.X-2: AN-parameters field

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| Each AN-parameter field is coded according to figure 9.3.2.2.X-3 and table 9.3.2.2.X-3. |
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| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |  |
| AN-parameter type | octet a+1 |
| AN-parameter length | octet a+2 |
| AN-parameter value | octet a+3octet b |

Figure 9.3.2.2.X-3: AN-parameter field

Table 9.3.2.2.X-3: AN-parameter field

|  |
| --- |
| The AN-parameter length field indicates the length of the AN-parameter value field. |
| The AN-parameter type field indicates the type of the AN-parameter value field. Sending entity shall not set the AN-parameter type field to a spare value. Receiving entity shall ignore any AN-parameter field with the AN-parameter type field set to a spare value. |
| The following AN-parameter type field values are specified:- 01H (TNGF IPv4 contact info);- 02H (TNGF IPv6 contact info);All other values of the AN-parameter type field are spare. Receiving entity shall ignore an AN-parameter field with the AN-parameter type field set to a spare value. |
| When the AN-parameter type field indicates the TNGF IPv4 contact info, the AN-parameter value field is coded as value part (as specified in 3GPP TS 24.007 [22] for type 3 information element) of TNGF IPv4 contact info information element as specified in subclause 9.2.5. |
| When the AN-parameter type field indicates the TNGF IPv6 contact info, the AN-parameter value field is coded as value part (as specified in 3GPP TS 24.007 [22] for type 3 information element) of TNGF IPv6 contact info information element as specified in subclause 9.2.6. |

##### 9.3.2.2.Y EAP-Response/5G-Notification message

EAP-Response/5G-Notification message is coded as specified in figure 9.3.2.2.Y-1 and table 9.3.2.2.Y-1.

|  |  |
| --- | --- |
| Bits |  |
| 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 | Octets |
| Code | 1 |
| Identifier | 2 |
| Length | 3 - 4 |
| Type | 5 |
| Vendor-Id | 6 - 8 |
| Vendor-Type | 9 - 12 |
| Message-Id | 13 |
| Spare | 14 |
| Extensions | n+x+1 - z+x |

Figure 9.3.2.2.Y-1: EAP-Response/5G-Notification message

Table 9.3.2.2.Y-1: EAP-Response/5G-Notification message

|  |
| --- |
| Code field is set to 2 (decimal) as specified in IETF RFC 3748 [9] subclause 4.1 and indicates response. |
| Identifier field is set as specified in IETF RFC 3748 [9] subclause 4.1. |
| Length field is set as specified in IETF RFC 3748 [9] subclause 4.1 and indicates the length of the EAP-Response/5G-Notification message in octets. |
| Type field is set to 254 (decimal) as specified in IETF RFC 3748 [9] subclause 5.7 and indicates the expanded type. |
| Vendor-Id field is set to the 3GPP Vendor-Id of 10415 (decimal) registered with IANA under the SMI Private Enterprise Code registry. |
| Vendor-Type field is set to EAP-5G method identifier of 3 (decimal) as specified in 3GPP TS 33.402 [10] annex C. |
| Message-Id field is set to 5G-Notification-Id of 3 (decimal). |
| Spare field consists of spare bits. |
| Extensions field is an optional field and consists of spare bits. |

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\* End of Change \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*