**3GPP TSG-SA3 Meeting #116 *S3-242393***

**Jeju, Korea (Republic Of), 20th May 2024 - 24th May 2024**

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| *CR-Form-v12.3* |
| **CHANGE REQUEST** |
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|  | **33.117** | **CR** | **DraftCR** | **rev** | **-** | **Current version:** | **18.3.0** |  |
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| *For* ***HE******LP*** *on using this form: comprehensive instructions can be found at http://www.3gpp.org/Change-Requests.* |
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| ***Proposed change affects:*** | UICC apps |  | ME |  | Radio Access Network |  | Core Network |  |

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| ***Title:***  | Add an OAuth2.0 test case to check for the absence of an access token |
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| ***Source to WG:*** | BSI (DE) |
| ***Source to TSG:*** | S3 |
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| ***Work item code:*** |  SCAS\_5G\_Maint |  | ***Date:*** | 2024-05-10 |
|  |  |  |  |  |
| ***Category:*** | **F** |  | ***Release:*** | Rel-19 |
|  | *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. | *Use one of the following releases:Rel-8 (Release 8)Rel-9 (Release 9)Rel-10 (Release 10)Rel-11 (Release 11)…Rel-17 (Release 17)Rel-18 (Release 18)Rel-19 (Release 19) Rel-20 (Release 20)* |
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| ***Reason for change:*** | In the current version of the TC\_AUTHORIZATION\_TOKEN\_VERIFICATION\_FAILURE\_ONE\_PLMN test case, a sub-test case where the NF function checks for the presence/absence of an OAuth2.0 token is missing. This is an important test, because in the current form, the tester assumes that this is checked by the NF. |
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| ***Summary of change:*** | - Add sub test case to check on the absence of the OAuth2.0 token- Add necessary prerequisites to the test case - Rename sub-test cases to A-I to be consistent with other sub-test cases. - Change evidence to a packet trace (pcap) |
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| ***Consequences if not approved:*** | Network functions can be audited with the GSMA NESAS scheme, but the OAuth2.0 checks are incorrectly implemented. An attacker can exploit this fact and access network information while not being authorized.  |
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| ***Clauses affected:*** | 4.2.2.2.3.1 |
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|  | **Y** | **N** |  |  |
| ***Other specs*** |  | **x** |  Other core specifications  | TS/TR ... CR ...  |
| ***affected:*** |  | **x** |  Test specifications | TS/TR ... CR ...  |
| ***(show related CRs)*** |  | **x** |  O&M Specifications | TS/TR ... CR ...  |
|  |  |
| ***Other comments:*** |  |
|  |  |
| ***This CR's revision history:*** |  |

\*\*\*\*\*\*\*\*\*\* START OF 1st CHANGE \*\*\*\*\*\*\*\*\*\*

###### 4.2.2.*2*.3.1 Authorization token verification failure handling within one PLMN

*Requirement Name*: Authorization token verification failure handling within one PLMN

*Requirement Reference:* TS 33.501 [10], clause 13.4.1.1

*Requirement Description*:

According to TS 33.501 [10], clause 13.4.1.1, the NF Service producer verifies the access token as follows:

- The NF Service producer ensures the integrity of the access token by verifying the signature using NRF’s public key or checking the MAC value using the shared secret. If integrity check is successful, the NF Service producer verifies the claims in the access token as follows:

NOTE: Void.

- It checks that the audience claim in the access token matches its own identity or the type of NF service producer. If a list of NSSAIs or list of NSI IDs is present, the NF service producer checks that it serves the corresponding slice(s).

- If an NF Set ID present, the NF Service Producer checks the NF Set ID in the claim matches its own NF Set ID.

- If the access token contains "additional scope" information (i.e. allowed resources and allowed actions (service operations) on the resources), it checks that the additional scope matches the requested service operation.

- If scope is present, it checks that the scope matches the requested service operation.

- It checks that the access token has not expired by verifying the expiration time in the access token against the current data/time.

- If the verification is successful, the NF Service producer executes the requested service and responds back to the NF Service consumer. Otherwise it replies based on Oauth 2.0 error response defined in RFC 6749 [12]. The NF service consumer optionally stores the received token(s). Stored tokens may be re-used for accessing service(s) from producer NF type listed in claims (scope, audience) during their validity time.

*Threat References*: TR 33.926 [4], clause 6.3.3.1, Incorrect Verification of Access Tokens

*Test Case*:

**Test Name:** TC\_AUTHORIZATION\_TOKEN\_VERIFICATION\_FAILURE\_ONE\_PLMN

**Purpose:**

Verify that the NF service producer does not grant service access if the verification of authorization token from a NF service consumer in the same PLMN fails.

**Procedure and execution steps:**

**Pre-Conditions:**

 - The tester shall know if the network product supports the following optional access token verification claims. If an optional claim is not supported, the associated sub-test case does not apply:

 - S-NSSAI (Test Case F)

 - NSI (Test Case G)

 - NF Set ID (Test Case H)

 - additional scope (Test Case I)

- Test environment with an NF service consumer.

- The NF service consumer may be simulated.

- The network product under test has already mutually authenticated with the NF service consumer.

- The tester shall have access to the interface between the NF service consumer and the network product under test.

- The tester has the NRF’s private key or the shared key.

- The network product under test is preconfigured with the NRF’s public key or the shared key.

- The network product under test is configured to check the OAuth2.0 access token.

**Execution Steps**

The network product under test receives the access token sent from the NF service consumer, verifies the access token based on OAuth 2.0.

Test Cases A~E are tests on failure handling by the network product under test when the mandatory claims in access token failed verification.

 Test Case A: No access token

1) The tester sends a request without a token to the network product under test.2) The network product under test recognized the absence of the access token and the verification of the access token fails.

Test Case B: Verification failure of the access token integrity

1) The tester computes an access token correctly, except that the signature or the MAC is incorrect, e.g., the signature or the MAC is randomly selected, and then includes the access token in the NF Service Request sent from the NF service consumer to the network product under test.

2) The integrity verification of the access token by the network product under test fails.

Test Case C: Incorrect audience claim in the access token

1) The tester computes an access token correctly, except that the audience claim is incorrect, i.e., the audience claim in the access token does not match the identity or the type of the network product under test, and then includes the access token in the NF Service Request sent from NF service consumer to the network product under test.

2) The network product under test verifies that the integrity of the access token is valid. However, the audience claim in the access token does not match its identity or type.

Test Case D: Incorrect scope claim in the access token

1) The tester computes an access token correctly, except that the scope is incorrect, i.e., the scope does not match the requested service operation, and then includes the access token in the NF Service Request sent from the NF service consumer to the network product under test.

2) The network product under test verifies that the integrity of the access token and the audience claim are valid. However, the scope does not match the requested service operation.

Test Case E: Expired access token

1) The tester computes an access token correctly, except that the expiration time has expired against the current data/time, and then includes the access token in the NF Service Request sent from the NF service consumer to the network product under test.

2) The network product under test verifies that the integrity of the access token, the audience and scope claims are all valid. However, the expiration time in the access token has expired against the current data/time.

Test Cases F~I are tests on failure handling by the network product under test when the optional claims in access token failed verification.

NOTE: The test cases below only apply to the NFs which support identifying and understanding the optional claims in the received access token.

Test Case F: Incorrect list of S-NSSAIs in the access token

1) The tester computes an access token correctly, except that the list of S-NSSAIs is incorrect, i.e., the network product under test does not serve the slices indicated in the list of S-NSSAIs, and then includes the access token in the NF Service Request sent from NF service consumer to the network product under test.

2) The network product under test verifies that the integrity of the access token, the audience, scope and expiration time claims are all valid. Then it further checks the list of S--NSSAIs included in the access token.

Test Case G: Incorrect list of NSIs in the access token

1) The tester computes an access token correctly, except that the list of NSIs is incorrect, i.e., the network product under test does not serve the slices indicated in the list of NSIs, and then includes the access token in the NF Service Request sent from NF service consumer to the network product under test.

2) The network product under test verifies that the integrity of the access token, the audience, scope and expiration time claims are all valid. Then it further checks the list of NSIs included in the access token.

Test Case H: Incorrect NF Set ID in the access token

1) The tester computes an access token correctly, except that the NF Set ID is incorrect, i.e. the NF Set ID in the claim does not match the NF Set ID of the network product under test, and then includes the access token in the NF Service Request sent from NF service consumer to the network product under test.

2) The network product under test verifies that the integrity of the access token, the audience, scope and expiration time claims are all valid. Then it further checks the NF Set ID included in the access token.

Test Case I: Incorrect additional scope in the access token

1) The tester computes an access token correctly, except that the additional scope information is incorrect, i.e. the allowed resources and allowed actions on the resources do not match the requested service operations, and then includes the access token in the NF Service Request sent from the NF service consumer to the network product under test.

2) The network product under test verifies that the integrity of the access token, the audience, scope and expiration time claims are all valid. Then it further checks the additional scope included in the access token.

**Expected Results:**

For test cases A-E on verification failure of mandatory claims in the access token, the network product under test rejects the NF service consumer’s service request based on OAuth 2.0 error response defined in RFC 6749 [12].

For test cases F-I on verification failure of optional claims in the access token, if the network product under test understands these optional claims (list of S-NSSAIs, list of NSIs, NF Set ID, additional scope), it rejects the NF service consumer’s service request based on OAuth 2.0 error response defined in RFC 6749 [12].

**Expected format of evidence:**

Evidence suitable for the interface, e.g., packet trace (pcap file).

### \*\*\*\*\*\*\*\*\*\* END OF CHANGE \*\*\*\*\*\*\*\*\*\*