**3GPP TSG-SA WG6 Meeting #63S6-244634**

**Hyderabad, India, 14th – 18th October 2024 (revision of S6-244134)**

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| --- |
| *CR-Form-v12.3* |
| **CHANGE REQUEST** |
|  |
|  | **23.433** | **CR** | **0089** | **rev** | **-** | **Current version:** | **19.3.0** |  |
|  |
| *For* ***[HE](http://www.3gpp.org/3G_Specs/CRs.htm%22%20%5Cl%20%22_blank)******[LP](http://www.3gpp.org/3G_Specs/CRs.htm%22%20%5Cl%20%22_blank)*** *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 | **X** | Radio Access Network |  | Core Network | **X** |

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|  |
| ***Title:***  | Add new feature to support the Multi-modal flows alignment and monitoring  |
|  |  |
| ***Source to WG:*** | China Mobile |
| ***Source to TSG:*** | S6 |
|  |  |
| ***Work item code:*** | XRM\_Ph2\_App |  | ***Date:*** | 2024-10-30 |
|  |  |  |  |  |
| ***Category:*** |  B |  | ***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](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-17 (Release 17)Rel-18 (Release 18)Rel-19 (Release 19)Rel-20 (Release 20)* |
|  |  |
| ***Reason for change:*** | The SEALDD (as XR application enabler) can facilitate Multi-modal flows alignment and monitoring for XR application, as concluded in TR 23.700-23 (KI#1, KI#2, sol#6) |
|  |  |
| ***Summary of change:*** | Add new feature to support the Multi-modal flows alignment and monitoring for XR application. |
|  |  |
| ***Consequences if not approved:*** | Not supporting new feature in Rel19 XR work. |
|  |  |
| ***Clauses affected:*** | 9.12.4.1,New clause:9.12.2.y, 9.12.3.m, 9.12.3.n, 9.12.3.o, 9.12.3.p, 9.12.3.u, 9.12.3.v, 9.12.3.w, 9.12.3.x, 9.12.3.y, 9.12.3.z, 9.12.3.m, 9.12.3.n, 9.12.4.a, 9.12.4.b, 9.12.4.c, 9.12.4.d, 9.12.4.e, 9.12.4.f |
|  |  |
|  | **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:*** |  |

 \* \* \* First Change \* \* \* \*

## 9.10 SEALDD policy configuration

### 9.10.1 General

The following clauses specify procedures, information flow for SEALDD policy configuration. In clause 9.10, the VAL server is a specific server for configurating SEALDD policy, and is different from the VAL server used for VAL application processing in other clauses.

Depending on the configuration, a SEALDD policy may apply to individual SEALDD flows or to multi-modal SEALDD flows.

### 9.10.2 Procedures

#### 9.10.2.1 SEALDD policy configuration

Figure 9.10.2.1-1 illustrates the procedure for SEALDD policy configuration from the VAL server used for SEALDD policy configuration to the SEALDD server.



Figure 9.10.2.1-1: SEALDD policy configuration

1. The VAL server sends the SEALDD policy configuration request to the SEALDD server. The request includes the identifiers of the application traffic (e.g. VAL service ID, VAL server ID), VAL UE identify, and the SEALDD policy.

2. The SEALDD server performs authorization check to verify whether the VAL server can be accepted/authorized to configure the SEALDD policy.

3. Upon successful authorization, the SEALDD server stores the SEALDD policy for later use (e.g. for bandwidth control, transmission quality guarantee) and replies to the VAL server with the SEALDD policy configuration response.

#### 9.10.2.2 SEALDD policy configuration update

Figure 9.10.2.2-1 illustrates the procedure for SEALDD policy configuration update from the VAL server used for SEALDD policy configuration to the SEALDD server.



Figure 9.10.2.2-1: SEALDD policy configuration update

1. The VAL server used for SEALDD policy configuration determines that the existing SEALDD policy needs to be updated, the VAL server sends the SEALDD policy configuration update request to the SEALDD server.

2. The SEALDD server performs authorization check to verify whether the VAL server can be accepted/authorized to update the SEALDD policy configuration.

3. Upon successful authorization, the SEALDD server updates the SEALDD policy configuration and replies to the VAL server with the SEALDD policy configuration update response.

#### 9.10.2.3 SEALDD policy configuration delete

Figure 9.10.2.3-1 illustrates the procedure for SEALDD policy configuration delete from the VAL server used for SEALDD policy configuration to the SEALDD server.



Figure 9.10.2.3-1: SEALDD policy configuration delete

1. The VAL server used for SEALDD policy configuration determines that the existing SEALDD policy needs to be deleted, the VAL server sends the SEALDD policy configuration delete request to the SEALDD server.

2. The SEALDD server performs authorization check to verify whether the VAL server can be accepted/authorized to delete the SEALDD policy configuration.

3. Upon successful authorization, the SEALDD server deletes the SEALDD policy configuration and replies to the VAL server with the SEALDD policy configuration update response.

#### 9.10.2.4 SEALDD client policy configuration request

Figure 9.10.2.4-1 illustrates the procedure for SEALDD client policy configuration request from the SEALDD server to the SEALDD client.

Pre-condition:

1. The SEALDD connectivity has been established between the SEALDD client and SEALDD server.

**Figure 9.10.2.3-1: SEALDD client policy configuration request**

1. Based on policy received from the VAL server(e.g., Multi-modal flows alignment policy), or SEALDD server determines that the policy needs to be configured to the SEALDD client, the SEALDD server sends the SEALDD client policy configuration request to the SEALDD client.

2. The SEALDD client performs authorization check to verify whether the SEALDD server can be authorized to configure the SEALDD client policy.

3. Upon successful authorization, the SEALDD server stores the SEALDD client policy for later use (e.g. for multi-modal flows alignment) and replies to the SEALDD server with the SEALDD client policy configuration response.

Editor’s note: The SEALDD client policy configuration update and delete will be defined is FFS.

### 9.10.3 Information flows

#### 9.10.3.1 SEALDD policy configuration request

Table 9.10.3.1-1 describes the information flow from the VAL server to the SEALDD server for requesting the SEALDD policy configuration.

Table 9.10.3.1-1: SEALDD policy configuration request

|  |  |  |
| --- | --- | --- |
| Information element | Status | Description |
| Application traffic identifiers | M | Identify of the application traffic (e.g. VAL server ID, VAL service ID) |
| -Identity | O | Identifier of the VAL UE or VAL user for which SEALDD policy applies |
| SEALDD policy | O(See NOTE 4) | The SEALDD policy associated with application traffic identifiers, VAL UE identity |
| > Quality guarantee policy | O(See NOTE 1) | Indicates the event (e.g. measurement threshold) to be measured for the quality guarantee |
| > Quality optimization policy | O(See NOTE 1) | Indicates the data transmission adjustment policy (e.g., adjustment need) to be performed in SEALDD layer. |
| > Bandwidth control policy | O(See NOTE 2) | Indicate the bandwidth control preference, e.g. re-allocating the bandwidth limit between different VAL users, including UL/DL |
| > Geofence policy  | O(See NOTE 3) | Indicates the geofence policy per VAL service  |
| >> Geofence location | O(See NOTE 3) | Indicates the geofence location information for the mentioned VAL service |
| >>Geofence policy action | O(See NOTE 3) | Indicates the policy action like allowed or blocked |
| > temporal policy | O(See NOTE 3) | Indicates the time period for which the sealdd traffic is allowed |
| > policy expiration time | O | Indicates the validity of the policy |
| Multi-modal SEALDD policy | O(See NOTE 4) | Multi-modal SEALDD policy associated with set of individual SEALDD flows. |
| > Synchronization policy | O | Indicates the synchronization threshold for multi-modal application, as specified in 3GPP TS 22.261 [2]  |
| > Multi-modal flows alignment policy | O | Indicates the information to do the multi-modal flows alignment, e.g., Multi-modal Service ID, maximum acceptable duration for traffic flow alignment. |
| > Policy expiration time | O | Indicates the validity period of the policy |
| NOTE 1: This IE is used for the SEALDD enabled transmission quality guarantee, as specified in clause 9.9.NOTE 2: This IE is used for the SEALDD enabled bandwidth control, as specified in clause 9.8.NOTE 3: This IE is used for the SEALDD connection establishment and data delivery, as specified in clause 9.2NOTE 4: At least one of these IEs shall be present. |

#### 9.10.3.2 SEALDD policy configuration response

Table 9.10.3.2-1 describes the information flow from the SEALDD server to the VAL server for responding to the SEALDD policy configuration.

Table 9.10.3.2-1: SEALDD policy configuration response

|  |  |  |
| --- | --- | --- |
| **Information element** | **Status** | **Description** |
| Result  | M | Success or failure. |
| > Configuration ID | O(See NOTE) | Identifier of the SEALDD policy configuration. |
| > Expiration time | O(See NOTE) | Indicates the expiration time of the configured SEALDD policy |
| NOTE: These IEs are used for the successful case for SEALDD policy configuration request. |

#### 9.10.3.3 SEALDD policy configuration update request

Table 9.10.3.3-1 describes the information flow from the VAL server to the SEALDD server for requesting the SEALDD policy configuration update.

Table 9.10.3.3-1: SEALDD policy configuration update request

|  |  |  |
| --- | --- | --- |
| Information element | Status | Description |
| Configuration ID | M | Identifier of the SEALDD policy configuration. |
| Updated SEALDD policy  | O | The updated SEALDD policy as described in Table 9.10.3.1-1. |

#### 9.10.3.4 SEALDD policy configuration update response

Table 9.10.3.4-1 describes the information flow from the SEALDD server to the VAL server for responding to the SEALDD policy configuration update.

Table 9.10.3.4-1: SEALDD policy configuration update response

|  |  |  |
| --- | --- | --- |
| **Information element** | **Status** | **Description** |
| Result  | M | Success or failure. |
| > Expiration time | O(See NOTE) | Indicates the expiration time of the configured SEALDD policy |
| NOTE: This IEs is used for the successful case for SEALDD policy configuration update request. |

#### 9.10.3.5 SEALDD policy configuration delete request

Table 9.10.3.5-1 describes the information flow from the VAL server to the SEALDD server for requesting the SEALDD policy configuration delete.

Table 9.10.3.5-1: SEALDD policy configuration delete request

|  |  |  |
| --- | --- | --- |
| Information element | Status | Description |
| Configuration ID | M | Identifier of the SEALDD policy configuration. |

#### 9.10.3.6 SEALDD policy configuration delete response

Table 9.10.3.6-1 describes the information flow from the SEALDD server to the VAL server for responding to the SEALDD policy configuration delete.

Table 9.10.3.6-1: SEALDD policy configuration delete response

|  |  |  |
| --- | --- | --- |
| **Information element** | **Status** | **Description** |
| Result  | M | Success or failure. |

#### 9.10.3.7 SEALDD client policy configuration request

Table 9.12.3.7-1 describes the information flow from the SEALDD server to the SEALDD client for requesting SEALDD client policy configuration.

Table 9.10.3.7-1: SEALDD client policy configuration request

|  |  |  |
| --- | --- | --- |
| **Information element** | **Status** | **Description** |
| Requestor ID | M | Identity of the requestor |
| SEALDD flow ID | O(NOTE 1) | Identity of the SEALDD flows |
| Traffic descriptor | O(NOTE 1) | SEALDD traffic descriptors for multiple flows (e.g. address(s), port(s), transport layer protocol) of the SEALDD server side used to establish SEALDD multi-modal connection |
| VAL service ID | M | Identity of the VAL service |
| UE ID | O | Identifier of specific UE or VAL user |
| Multi-modal flows alignment policy | O | Multi-modal flows alignment Policy |
| >Multi-modal Service ID | O | Identifier of Multi-modal Service |
| >Flows transmission requirement | O | Flows transmission requirement including the delay requirement, maximum acceptable duration for traffic flow alignment. Maximum acceptable time duration for traffic flow alignment is used to limit the maximum waiting time for the associated flow |
| NOTE 1: At least one of these IEs shall be present in the message. |

#### 9.10.3.8 SEALDD client policy configuration response

Table 9.10.3.8-1 describes the information flow from the SEALDD server to the VAL server for response SEALDD client policy configuration.

Table 9.10.3.8-1: SEALDD client policy configuration response

|  |  |  |
| --- | --- | --- |
| **Information element** | **Status** | **Description** |
| Result | M | Success or failure of the request. |

### 9.10.4 APIs

#### 9.10.4.1 General

Table 9.10.4.1-1 illustrates the APIs exposed by SEALDD server for SEALDD policy configuration.

Table 9.10.4.1-1: List of SEALDD server APIs for policy configuration

|  |  |  |  |
| --- | --- | --- | --- |
| **API Name** | **API Operations** | **Operation Semantics** | **Consumer(s)** |
| Sdd\_PolicyConfiguration | Request | Request/Response | VAL server |
| Update |
| Delete |
| Sdd\_ClientPolicyConfiguration | Request | Request/Response | SEALDD server |

#### 9.10.4.2 Sdd\_PolicyConfiguration operation

**API operation name:** Sdd\_PolicyConfiguration\_Request

**Description:** The consumer requests for one time for SEALDD policy configuration.

**Inputs:** See clause 9.10.3.1.

**Outputs:** See clause 9.10.3.2.

See clause 9.10.2.1 for details of usage of this operation.

#### 9.10.4.3 Sdd\_PolicyConfiguration update operation

**API operation name:** Sdd\_PolicyConfiguration\_Update

**Description:** The consumer requests for one time for SEALDD policy configuration update.

**Inputs:** See clause 9.10.3.3.

**Outputs:** See clause 9.10.3.4.

See clause 9.10.2.2 for details of usage of this operation.

#### 9.10.4.4 Sdd\_PolicyConfiguration delete operation

**API operation name:** Sdd\_PolicyConfiguration\_Delete

**Description:** The consumer requests for one time for SEALDD policy configuration deletion.

**Inputs:** See clause 9.10.3.5.

**Outputs:** See clause 9.10.3.6.

See clause 9.10.2.3 for details of the usage of this operation.

#### 9.10.4.5 Sdd\_ClientPolicyConfiguration operation

**API operation name:** Sdd\_ClientPolicyConfiguration\_Delete

**Description:** The consumer requests for one time for SEALDD Client policy configuration.

**Inputs:** See clause 9.10.3.7.

**Outputs:** See clause 9.10.3.8.

See clause 9.10.2.4 for details of the usage of this operation.

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

#### 9.12.2.2 SEALDD enabled multi-modal flow synchronization

##### 9.12.2.2.1 General

The following clauses specify procedures, information flows and APIs about SEALDD enabled data transmission for XR application, including SEALDD enabled multi-modal flow synchronization.

##### 9.12.2.2.2 SEALDD enabled multi-modal flow synchronization

Figure 9.12.2.2.2-1 illustrate the procedure for SEALDD enabled multi-modal flow synchoronization, the SEALDD server determines/updates the required QoS information for multi-modal flow(s), and further interacts with 5G network.

Pre-condition:

- The VAL server can discover and select the SEALDD server by CAPIF functions.

- The SEALDD server has been provisioned to multi-modal XR policy including the synchronization threshold, as specified in clause 9.10.3.1.

- The SEALDD client has been provisioned to multi-modal SEALDD policy, as specified in clause 9.10.2.3.



Figure 9.12.2.2.2-1: SEALDD enabled multi-flow synchronization procedure

1. An on-going multi-modal data transmission connection is established according to the steps 1-8 of clause 9.12.2.1.2.

2. Upon the multi-modal flows alignment policy triggered, the SEALDD server may help to provide the flows alignment assistance information (e.g. timestamp in the RTP header, RTCP). If the maximum acceptable duration for traffic flow alignment is not provided, then the SEALDD server may determine the maximum acceptable duration for traffic flow alignment based on VAL service ID, flows transmission requirement, transmission quality, and the synchronization threshold. The server may translate the traffic descriptor into SEALDD flow ID.

NOTE 1: The flow alignment assistance information can be obtained by SEALDD server based on SEALDD policy.

NOTE 2: The SEALDD client performs the caching and transmission to align multi-modal flows based on the flow alignments assistance information and maximum acceptable time duration.

Editor's note: Whether and how to make use of existing CN functionality (e.g. PDU set related feature) is FFS.

NOTE 3: The NTP timestamp and RTP timestamp in RTCP sender report (SR) can be used to to identify the associated packet among muti-modal flow, and further be used to perform alignment in SEALDD client.

3. Upon the multi-modal flows alignment policy triggered, the SEALDD client initiates the multi-modal flows alignment based on the policy. The flows need to be aligned are identified by the VAL service ID, traffic descriptor, and flow alignment assistance information.

If the flow alignment assistance information is provided, the SEALDD client can identify the associated packets (e.g., those with the same RTP timestamp) in the multi-modal flows. After all associated packets in the multi-modal flows have arrived, the SEALDD client sends the associated packets to the application client. If the maximum acceptable time duration is provided, once this maximum acceptable time is reached, the SEALDD client will no longer wait for the associated packets in multi-modal flows, even if they have not arrived yet.

4. The SEALDD server performs data transmission quality measurement in SEALDD-UU interface based on the mapping information for multiple flow association information between SEALDD-S interface and SEALDD-UU interface. Upon receiving the packets from multiple associated flows in SEALDD-S interface, the SEALDD server performs the packet encapsulation with sending timestamp information in the corresponding SEALDD-UU interface, and can calculate the transmission delay measurement result of multiple associated flows after obtaining the receiving timestamp from the SEALDD client.

5. Based on the calculated transmission delay for multiple associated flow over SEALDD-UU interface in step 2, and the synchronization threshold for multi-modal application as described in pre-condition, the SEALDD server can determine the service flow(s) (i.e. address/port for SEALDD-UU flow) that needs to be adjusted among the multiple associated flows in SEALDD-UU interface, and the corresponding required QoS information (i.e. transmission delay).

6. The SEALDD server sends the AF request to 5GC via N33/N5 with the SEALDD traffic descriptor of the adjusted flow(s) (i.e. address/port for the adjusted SEALDD-UU flow) and the corresponding required QoS information determined in step 3, by utilizing the AF session with required QoS procedure in clause 4.15.6.6 of TS 23.502 [6]. The SEALDD traffic descriptor of the adjusted flow(s) contains the address or port in SEALDD server side, and/or SEALDD client side.

NOTE: This procedure is applicable for both downlink and uplink synchronization of multi-modal flow. For downlink and/or uplink, the step 3 is determined according to the measured downlink and/or uplink transmission delay in step 2.

After requesting the transmission quality optimization on 5G network with the required QoS for the adjusted flow(s), the multi-flow synchronization of multi-modal application can be satisfied.

Editor’s note: Whether and how the multi-modal flows alignment monitoring will be defined is FFS.

 \* \* \* END of Change \* \* \* \*