**SA WG2 Meeting #S2-143E  *S2-200xxxx***

**24 February – 9 March, 2021, Elbonia**

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| *CR-Form-v12.0* |
| **CHANGE REQUEST** |
|  |
|  | **23.502** | **CR** |  | **rev** | **-** | **Current version:** | **16.7.0** |  |
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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 |  | Radio Access Network |  | Core Network | **X** |

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|  |
| ***Title:***  | KI #1-1, I-SMF selection |
|  |  |
| ***Source to WG:*** | CATT, ZTE, Nokia?, Huawei? |
| ***Source to TSG:*** | SA2 |
|  |  |
| ***Work item code:*** |  |  | ***Date:*** | 2021-02-24 |
|  |  |  |  |  |
| ***Category:*** | **B** |  | ***Release:*** | Rel-17 |
|  | *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:*** | Per TR 23.748 clause 9.3, it is concluded to support SMF sending the target DNAI(s) to the AMF to assistant the I-SMF selection. |
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| ***Summary of change:*** | SMF sending the target DNAI(s) to the AMF to assistant the I-SMF selection. |
|  |  |
| ***Consequences if not approved:*** | 4.3.6.2, 4.23.2, 4.23.5.1, 4.23.5.4, 5.2.8.2.5, 5.2.8.2.8 |
|  |  |
| ***Clauses affected:*** |  |
|  |  |
|  | **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:*** |  |

\* \* \* \* 1st change \* \* \* \*

#### 4.3.6.2 Processing AF requests to influence traffic routing for Sessions not identified by an UE address



Figure 4.3.6.2-1: Processing AF requests to influence traffic routing for Sessions not identified by an an UE address

NOTE 1: The 5GC functions used in this scenario are assumed to all belong to the same PLMN (HPLMN in non-roaming case or VPLMN in the case of a PDU Session in LBO mode).

NOTE 2: Nnef\_TrafficInfluence\_Create or Nnef\_TrafficInfluence\_Update or Nnef\_TrafficInfluence\_Delete service operations invoked from an AF located in the HPLMN for local breakout and home routed roaming scenarios are not supported.

1. To create a new request, the AF invokes an Nnef\_TrafficInfluence\_Create service operation. The content of this service operation (AF request) is defined in clause 5.2.6.7. The request contains also an AF Transaction Id. If it subscribes to events related with PDU Sessions the AF indicates also where it desires to receive the corresponding notifications (AF notification reporting information).

 To update or remove an existing request, the AF invokes an Nnef\_TrafficInfluence\_Update or Nnef\_TrafficInfluence\_Delete service operation providing the corresponding AF Transaction Id.

2. The AF sends its request to the NEF. If the request is sent directly fom the AF to the PCF, the AF reaches the PCF selected for the existing PDU Session by configuration or by invoking Nbsf\_management\_Discovery service.

 The NEF ensures the necessary authorization control, including throttling of AF requests and, as described in clause 4.3.6.1, mapping from the information provided by the AF into information needed by the 5GC.

3. (in the case of Nnef\_TrafficInfluence\_Create or Update): The NEF stores the AF request information in the UDR (Data Set = Application Data; Data Subset = AF traffic influence request information, Data Key = AF Transaction Internal ID, S-NSSAI and DNN and/or Internal Group Identifier or SUPI).

NOTE 3: Both the AF Transaction Internal ID and, S-NSSAI and DNN and/or Internal Group Identifier or SUPI are regarded as Data Key when the AF request information are stored into the UDR, see Table 5.2.12.2.1-1.

 (in the case of Nnef\_TrafficInfluence\_delete): The NEF deletes the AF requirements in the UDR (Data Set = Application Data; Data Subset = AF traffic influence request information, Data Key = AF Transaction Internal ID).

 The NEF responds to the AF.

4. The PCF(s) that have subscribed to modifications of AF requests (Data Set = Application Data; Data Subset = AF traffic influence request information, Data Key = S-NSSAI and DNN and/or Internal Group Identifier or SUPI) receive(s) a Nudr\_DM\_Notify notification of data change from the UDR.

5. The PCF determines if existing PDU Sessions are potentially impacted by the AF request. For each of these PDU Sessions, the PCF updates the SMF with corresponding new PCC rule(s) by invoking Npcf\_SMPolicyControl\_UpdateNotify service operation as described in steps 5 and 6 in clause 4.16.5.

 If the AF request includes a notification reporting request for UP path change, the PCF includes in the PCC rule(s) the information required for reporting the event, including the Notification Target Address pointing to the NEF or AF and the Notification Correlation ID containing the AF Transaction Internal ID.

6. When a PCC rule is received from the PCF, the SMF may take appropriate actions to reconfigure the User plane of the PDU Session such as:

- Adding, replacing or removing a UPF in the data path to e.g. act as an UL CL or a Branching Point e.g. as described in clause 4.3.5.

- Allocate a new Prefix to the UE (when IPv6 multi-Homing applies)

- Updating the UPF in the target DNAI with new traffic steering rules

 Subscribe to notifications from the AMF for an Area Of Interest via Namf\_EventExposure\_Subscribe service operation

7. When the target DNAI(s) is received from the PCF, the SMF may decide whether it is required to send the target DNAI to the AMF for triggering I-SMF selection and then inform the target DNAI(s) to AMF via Nsmf\_PDUSession\_SMContextStatusNotify service operation.

\* \* \* \* End of 1st change \* \* \* \*

\* \* \* \* 2nd change \* \* \* \*

### 4.23.2 I-SMF selection

For non roaming or LBO roaming case, the AMF selects an SMF serving the PDU Session as described in clause 4.3.2.2.3. If the service area of the selected SMF does not control UPF that can serve the UE location or the selected SMF cannot serve the DNAI(s) requested by the AF, the AMF selects an I-SMF as described in clause 5.34.3 of TS 23.501 [2].

For home routed roaming case, the AMF selects V-SMF as described in clause 4.3.2.2.3.2 and reselects V-SMF as described in clause 5.34.3 of TS 23.501 [2].

When the delegated discovery is used, the SCP selects the SMF as described in clause 5.34.3 of TS 23.501 [2] and in Annex E.

\* \* \* \* End of 2nd change \* \* \* \*

\* \* \* \* 3rd change \* \* \* \*

#### 4.23.5.1 PDU Session establishment procedure

For non roaming or LBO roaming, it includes the following cases:

- If the service area of the selected SMF includes the current UE location, the UE requested PDU Session Establishment procedure is same as described in clause 4.3.2.2.1.

- If the service area of the selected SMF does not include the current UE location and the UE does not request for a MA PDU Session, the AMF selects an I-SMF that serves the area where UE camps. The UE requested PDU Session Establishment procedure for Home-routed Roaming defined in clause 4.3.2.2.2 is used to establish the PDU Session. Compared to the procedure defined in clause 4.3.2.2.2, the V-SMF and V-UPF are replaced by I-SMF and I-UPF, and H-SMF and H-UPF are replaced by SMF and UPF(PSA) respectively. Also, only the S-NSSAI with the value defined by the serving PLMN is sent to the SMF. The I-SMF provides the DNAI list it supports to SMF and the SMF provides the DNAI(s) of interest for this PDU Session to I-SMF based on the DNAI list information received from I-SMF as defined in Figure 4.23.9.1-1 step 1.

 This may happen e.g. at PDU Session mobility from non-3GPP access to 3GPP access as defined in clause 4.23.15.

- If the service area of the selected SMF does not include the current UE location and the UE requests a MA PDU Session, then the AMF rejects the MA PDU Session Establishment procedure.

- When the delegated discovery is used, the SCP selects the SMF as described in Annex E.

- If an I-SMF is selected and the PDU Session supports mechanisms for redundant transmission defined in TS 23.501 [2] clause 5.33.2.2, the SMF rejects the PDU Session Establishment Request.

- If an I-SMF is selected and the PDU Session supports Time Sensitive Communications (as defined in TS 23.501 [2] clause 5.27 and 5.28), or if the PDU session supports redundant transmission defined in TS 23.501 [2] clauses 5.33.2.1 or 5.33.2.3, the SMF may, based on local policy, reject the PDU Session Establishment Request.

- If the selected SMF cannot serve the target DNAI requested by AF, the AMF selects an I-SMF that serves the target DNAI for Local DN.

For the Home-Routed roaming case, the UE requested PDU Session Establishment procedure for Home-routed Roaming in clause 4.3.2.2.2 can be reused with the following change.

- If the service area of the selected V-SMF does not include the current UE location and the UE requests a MA PDU Session, then the AMF rejects the MA PDU Session Establishment procedure.

\* \* \* \* End of 3rd change \* \* \* \*

\* \* \* \* 4th change \* \* \* \*

#### 4.23.5.4 I-SMF selection per target DNAI



**Figure 4.23.5.4-1: I-SMF selection per DNAI**

1. The AF influence on traffic routing procedure defined in clause 4.3.6.2, starting from step 1-4 is executed.

2. The PCF updates the SMF with corresponding new PCC rule(s) including the DNAI(s) for the PDU sessions by invoking Npcf\_SMPolicyControl\_UpdateNotify service operation.

Based on the received DNAI(s) information, the SMF may subscribe to the UE mobility event notification from the AMF (e.g. UE moving into or out of Area of Interest).

The SMF determines the target DNAI(s) which are applicable to the current UE location. Then the SMF may decide the target DNAI finally.

3. The SMF invokes a Nsmf\_PDUSession\_SMContextStatusNotify service operation if it (or the associated old I-SMF) cannot serve the target DNAI(s), and the content of the message includes the target DNAI. This message triggers the AMF to select a suitable I-SMF for the PDU Session.

 If there is an I-SMF serving the PDU session, the SMF invokes Nsmf\_PDUSession\_StatusNotify and then the I-SMF invokes Nsmf\_PDUSession\_SMContextStatusNotify message to send the target DNAI for existing PDU session to AMF.

4. The AMF may select a new I-SMF which can serve the target DNAI for the PDU Session.

 If the AMF doesn't have the knowledge which DNAI(s) the I-SMF/SMF can serve the target DNAI based on local configuration, it invokes the NF discovery request with NRF which provides the list of SMFs supporting the requested DNAI(s).

5. The AMF sends a Nsmf\_PDUSession\_CreateSMContext Request to the new I-SMF, the request message includes the target DNAI.

6. The procedure described in clauses 4.23.4.3 (case: I-SMF insertion or I-SMF change).

\* \* \* \* End of 4th change \* \* \* \*

\* \* \* \* 5th change \* \* \* \*

##### 5.2.8.2.5 Nsmf\_PDUSession\_CreateSMContext service operation

**Service operation name:** Nsmf\_PDUSession\_CreateSMContext.

**Description:** It creates an AMF-SMF association to support a PDU Session.

**Input, Required:** SUPI or PEI, DNN, AMF ID (AMF Instance ID), RAT Type, Serving Network (PLMN ID, or PLMN ID and NID, see clause 5.18 of TS 23.501 [2]).

**Input, Optional:** PEI, S-NSSAI(s), PDU Session Id, N1 SM container, UE location information, UE Time Zone, AN type, H-SMF identifier/address, list of alternative H-SMF(s) if available, old PDU Session ID (if the AMF also received an old PDU Session ID from the UE as specified in clause 4.3.5.2), Subscription For PDU Session Status Notification, Subscription for DDN Failure Notification, NEF Correlation ID, indication that the SUPI has not been authenticated, PCF ID, PCF Group ID, DNN Selection Mode, UE PDN Connection Context, GPSI, UE presence in LADN service area, GUAMI, backup AMF(s) (if NF Type is AMF), Trace Requirements, Control Plane CIoT 5GS Optimisation indication, Small Data Rate Control Status, APN Rate Control Status. Backup AMF(s) sent only once by the AMF to the SMF in its first interaction with the SMF, UE's Routing Indicator or UDM Group ID for the UE, EPS Bearer Status. Target ID (for EPS to 5GS handover), "Invoke NEF" flag, target DNAI, additional following three for SM context transfer: SMF transfer indication, Old SMF ID, SM context ID in old SMF (see clause 4.26.5.3), HO Preparation Indication. MA PDU request indication, MA PDU Network-Upgrade Allowed indication, Indication on whether the UE is registered in both accesses.

**Output, Required:** Result Indication, and if successful SM Context ID.

**Output, Optional:** Cause, PDU Session ID, N2 SM information, N1 SM container, S-NSSAI(s).

When the PDU Session is for Emergency services for a UE without USIM, the AMF provides the PEI and not the SUPI as identifier of the UE. When the PDU Session is for Emergency services of an unauthenticated UE with an USIM, the AMF shall provide both the SUPI and the PEI and shall provide an indication that the SUPI has not been authenticated.

See clause 4.3.2.2.1, clause 4.3.2.2.2, clause 4.11.1.2.2 and clause 4.11.1.3.3 for details on the usage of this service operation.

See clauses 4.22.2.1 and 4.22.3 for detailed usage of this service operation for ATSSS.

\* \* \* \* End of 5th change \* \* \* \*

\* \* \* \* 6th change \* \* \* \*

##### 5.2.8.2.8 Nsmf\_PDUSession\_SMContextStatusNotify service operation

**Service operation name:** Nsmf\_PDUSession\_SMContextStatusNotify.

**Description:** This service operation is used by the SMF to notify its consumers about the status of an SM context related to a PDU Session (e.g. PDU Session Release due to local reasons within the SMF, PDU Session handover to a different system or access type, SMF context transfer, triggering I-SMF selection for the PDU Session). The SMF may use this service operation to update the SMF derived CN assisted RAN parameters tuning in the AMF. The SMF may report the DDN Failure with NEF Correlation ID to the AMF.

**Input, Required:** Status information.

**Input, Optional:** Cause, SMF derived CN assisted RAN parameters tuning, New SMF ID for SM Context Transfer (see clause 4.26.5.3) or SMF set ID, Small Data Rate Control Status, APN Rate Control Status, DDN Failure detected in (I-/V-)SMF, target DNAI.

**Output, Required:** Result Indication.

**Output, Optional:** None.

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