**3GPP TSG-SA WG2 Meeting # 153E *S2-220xxxx***

 **Electronic, October 10 – 17, 2022**

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| *CR-Form-v12.2* |
| **CHANGE REQUEST** |
|  |
|  | **23.502** | **CR** | **<CR#>** | **rev** | **-** | **Current version:** | **17.6.0** |  |
|  |
| *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:***  | Enabling AF to request predefined SFC |
|  |  |
| ***Source to WG:*** | ETRI |
| ***Source to TSG:*** | SA WG2 |
|  |  |
| ***Work item code:*** | SFC |  | ***Date:*** | 2022-09-30 |
|  |  |  |  |  |
| ***Category:*** | **B** |  | ***Release:*** | Rel-18 |
|  | *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-16 (Release 16)Rel-17 (Release 17)Rel-18 (Release 18)Rel-19 (Release 19)* |
|  |  |
| ***Reason for change:*** | TS 23.502 should be updated to allow the AF to request pre-defined SFC for traffic flow(s) associated with target UEs based on the interim conclusion for KI#2 in TR 23.700-18. |
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| ***Summary of change:*** | This CR incorporates the improvements indicated below for TS 23.502 in order to support the SFC functionality.1. The Nnef\_TrafficInluence API is enhanced to include additionally an SFC policy identifier corresponding to a pre-defined Service Function Chain policy.
2. Influence traffic routing procdure is updated to support:
* mapping of the SFC policy identifier to a corresponding identifier within the PCC rule; and
* simultaneous application of N6-LAN traffic steering control and AF-influenced traffic steering control to the same traffic.
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| ***Consequences if not approved:*** | In order to implement the SFC feature, 5GS cannot provide network capability exposure functionality. |
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| ***Clauses affected:*** | 4.3.6.2, 4.3.6.4, 5.2.6.7.2 |
|  |  |
|  | **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 \* \* \*

#### 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 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.

NOTE 3: The SFC policies apply for SFC processing in non-roaming and home routed roaming scenarios.

1. To create a new request, the AF invokes a 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 a Nnef\_TrafficInfluence\_Update or Nnef\_TrafficInfluence\_Delete service operation providing the corresponding AF Transaction Id.

 The Nnef\_TrafficInfluence\_Create (initiated by target AF) or Nnef\_TrafficInfluence\_Update (initiated by source AF or target AF) service operation may be used for the case of AF instance change. If Nnef\_TrafficInfluence\_Update service operation is invoked, the NEF is required to update the subscription resource. The Nnef\_TrafficInfluence\_Update service operation may include an updated notification target address. The updated subscription resource is used by the target AF.

NOTE 3: If the source AF transfers the application context to the target AF, then target AF may create new subscription via Nnef\_TrafficInfluence\_Create operation or update existing subscription via Nnef\_TrafficInfluence\_Update. However, whether and how the application context transfer is done is out of this specification.

2. The AF sends its request to the NEF. If the request is sent directly from 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 4: 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 policy information about the PDU Session 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.

 The PCF may, optionally, use service experience analytics per UP path, as defined in clause 6.4.3 of TS 23.288 [50], to provide an updated list of DNAI(s) to the SMF.

 The PCF maps the SFC policy identifier, as defined in clause x.x of TS 23.501 [2], to a corresponding identifier within the PCC rule.

6. When the updated policy information about the PDU Session is received from the PCF, the SMF may take appropriate actions to reconfigure the User plane of the PDU Session. The SMF may consider service experience analytics and/or DN Performance analytics per UP path (i.e. including UPF and/or DNAI and/or AS instance) as defined in clauses 6.4.3 and 6.14.3, respectively, of TS 23.288 [50] before taking such actions. Examples of actions are:

- Determining a target DNAI and 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.

- Determining whether to relocate PSA UPF considering the user plane latency requirements provided by the AF (see clause 6.3.6 of TS 23.548 [74]).

 When the updated policy information about the PDU Session is received from the PCF, the SMF may take appropriate actions to assist the EAS discovery and re-discovery for PDU Session with Session Breakout connectivity model such as:

- Retrieve the EAS deployment information as defined in clause 6.2.3.4.1 of TS 23.548 [74].

- Providing DNS message handling rule to forward DNS messages of the UE and/or report when detecting DNS messages as defined in clause 6.2.3.2.2 of TS 23.548 [74].

 When the updated policy information about the PDU Session is received from the PCF, the SMF may take appropriate actions to assist the N6-LAN traffic steering control and AF-influenced traffic steering control:

- Updating the UPF with traffic steering rules from N6-LAN traffic steering control and/or AF-influenced traffic steering control that are applicable to the same traffic simultaneously.

7. The SMF may decide whether it is required to send the target DNAI to the AMF for triggering SMF/I-SMF (re)selection and then inform the target DNAI information for the current PDU session or for the next PDU session to AMF via Nsmf\_PDUSession\_SMContextStatusNotify service operation.

\* \* \* Second Change \* \* \*

#### 4.3.6.4 Transferring an AF request targeting an individual UE address to the relevant PCF



Figure 4.3.6.4-1: Handling an AF request targeting an individual UE address to the relevant PCF

Depending on the AF deployment (see clause 6.2.10 of TS 23.501 [2]), the AF may send the AF request to PCF directly, in which case step 1 is skipped, or via the NEF.

1. [Conditional] If the AF sends the AF request via NEF, the AF sends Nnef\_TrafficInfluenceCreate/Update/Delete Request targeting an individual UE address to the NEF. This request corresponds to an AF request to influence traffic routing that targets an individual UE address.

 When NEF receives an AF request from AF, the NEF ensures the necessary authorization control and, as described in clause 4.3.6.1, mapping from the information provided by the AF into information needed by the 5GC. The NEF responds to the AF.

2. [Conditional] AF/NEF consumes Nbsf\_Management\_Discovery service operation (providing at least the UE address) to find out the address of the relevant PCF if the PCF address is not available on the NEF based on local configuration, otherwise step 1 is skipped.

NOTE 1: The AF/NEF finds the BSF based on local configuration or using the NRF.

3. BSF provides the PCF address in the Nbsf\_Management\_Discovery response to AF/NEF.

4. If step 1 was performed, NEF invokes the Npcf\_PolicyAuthorization service to the PCF to transfer the AF request. If an AF sends the AF request directly to the PCF, AF invokes Npcf\_PolicyAuthorization service and the PCF responds to the AF. To support the AF instance change, the Npcf\_PolicyAuthorization\_Create (initiated by target AF) or Npcf\_PolicyAuthorization\_Update (initiated by source AF or target AF) service operation may be used.

NOTE 2: If the source AF transfers the application context to the target AF, then target AF may create new subscription via Npcf\_PolicyAuthorization\_Create or update existing subscription via Npcf\_PolicyAuthorization\_Update. However, whether and how the application context transfer is done is out of this specification.

5. The PCF authorizes the AF request. If the PCF determines that the requirements can't be authorized, it rejects the AF request. Once the PCF authorizes the AF request, the PCF updates the SMF with corresponding new PCC rule(s) with PCF initiated SM Policy Association Modification procedure as described in clause 4.16.5.2.

 The PCF may, optionally, use service experience analytics per UP path, as defined in clause 6.4.3 of TS 23.288 [50], to provide a an updated list of DNAI(s) to the SMF.

 If Npcf\_PolicyAuthorization\_Update service operation is invoked, the PCF is required to update the subscription resource. The Npcf\_PolicyAuthorization\_Update service operation may include an updated notification target address. The updated subscription resource is used by the target AF.

 When a PCC rule is received from the PCF, the SMF may take appropriate actions, when applicable, to reconfigure the User plane of the PDU Session. The SMF may consider service experience analytics and/or DN Performance analytics per UP path (i.e. including UPF and/or DNAI and/or AS instance) as defined in clauses 6.4.3 and 6.14.3, respectively, of TS 23.288 [50] before taking such actions. Examples of actions are:

- Determining a target DNAI and adding, replacing or removing UPF(s) in the data path, e.g. to act as UL CL, Branching Point, and/or PDU Session Anchor e.g. as described in clause 4.3.5.

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

- Updating the UPF regarding 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.

- Determining whether to relocate PSA UPF considering the user plane latency requirements provided by the AF (see clause 6.3.6 of TS 23.548 [74]).

- Updating the UPF with traffic steering rules to assist the N6-LAN traffic steering control and/or AF-influenced traffic steering control as described in clause 4.3.6.2.

\* \* \* Third Change \* \* \*

#### 5.2.6.7 Nnef\_TrafficInfluence service

##### 5.2.6.7.1 General

**Service description:** This service provides:

- Request authorization of NF Service Consumer requests.

- Request parameter mapping from NF Service Consumer requests to 5GC parameters and vice versa as described in clause 5.6.7 of TS 23.501 [2].

- NF Service Consumer request routing (forwarding) to actual NF Service Producer to influence traffic routing decisions as described in clause 5.6.7 of TS 23.501 [2].

##### 5.2.6.7.2 Nnef\_TrafficInfluence\_Create operation

**Service operation name:** Nnef\_TrafficInfluence\_Create

**Description:** Authorize the request and forward the request for traffic influence.

**Inputs, Required:** AF Transaction Id, AF Identifier.

The AF Transaction Id refers to the request.

**Inputs, Optional:** The address (IP or Ethernet) of the UE if available, GPSI if available, DNN if available, S-NSSAI if available, External Group Identifier if available, External Application Identifier or traffic filtering information, AF-Service-Identifier, a list of DNAI(s) and corresponding routing profile ID(s) or N6 traffic routing information, Indication of traffic correlation, Indication of application relocation possibility, Indication of UE IP address preservation, Early and/or late notifications about UP path management events, Notification Target Address, Temporal validity condition, Spatial validity condition, User Plane Latency Requirements, Information for EAS IP Replacement in 5GC, Indication for EAS Relocation and AF indication for simultaneous connectivity over source and target PSA at edge relocation as described in clause 5.6.7 of TS 23.501 [2], SFC policy identifier(s) as described in clause x.x of TS 23.501 [2].

Editor's note: It is FFS to support metadata as an optional input from the AF using Nnef\_TrafficInfluence service.

NOTE: When only one DNAI and corresponding routing profile ID(s) and the Indication for EAS Relocation are available, the presented DNAI is the target DNAI as defined in clause 6.3.7 of TS 23.548 [74].

**Outputs, Required:** Operation execution result indication.

**Outputs, Optional:** None.

##### 5.2.6.7.3 Nnef\_TrafficInfluence\_Update operation

**Service operation name:** Nnef\_TrafficInfluence\_Update

**Description:** Authorize the request and forward the request to update the traffic influence.

**Inputs, Required:** AF Transaction Id.

The AF Transaction Id identifies the NF Service Consumer request to be updated.

**Inputs, Optional:** Same optional information as in Nnef\_TrafficInfluence\_Create Input, AF Identifier.

**Outputs, Required:** Operation execution result indication.

**Outputs, Optional:** None.

##### 5.2.6.7.4 Nnef\_TrafficInfluence\_Delete operation

**Service operation name:** Nnef\_TrafficInfluence\_Delete

**Description:** Authorize the request and forward the request to delete(s) request for traffic influence.

**Inputs, Required:** AF Transaction Id.

The AF Transaction Id identifies the NF Service Consumer request for traffic influence to be deleted.

**Inputs, Optional:** None.

**Outputs, Required:** Operation execution result indication.

**Outputs, Optional:** None.

##### 5.2.6.7.4A Nnef\_TrafficInfluence\_Get operation

**Service operation name:** Nnef\_TrafficInfluence\_Get

**Description:** Get the current traffic influence parameters.

**Inputs, Required:** AF Transaction Id.

The AF Transaction Id refers to the request.

**Inputs, Optional:** The address (IP or Ethernet) of the UE if available, GPSI if available, DNN if available, S-NSSAI if available, External Group Identifier if available, External Application Identifier or traffic filtering information, AF-Service-Identifier, a list of DNAI(s) and corresponding routing profile ID(s) or N6 traffic routing information.

**Outputs, Required:** Operation execution result indication, requested data.

**Outputs, Optional:** None.

##### 5.2.6.7.5 Nnef\_TrafficInfluence\_Notify operation

**Service operation name:** Nnef\_TrafficInfluence\_Notify

**Description:** Forward the notification of UP path management event report to AF.

**Known NF Service Consumers:** AF.

**Inputs, Required:** AF Transaction Id, Event ID.

The AF Transaction Id identifies the AF request for traffic influence that the event report is related to. The event may be the UP path management event defined in clause 5.6.7 of TS 23.501 [2].

**Inputs, Optional:** Event information (defined on a per Event ID basis), capability of supporting EAS IP replacement in 5GC.

**Outputs, Required:** Operation execution result indication.

**Outputs, Optional:** None.

##### 5.2.6.7.6 Nnef\_TrafficInfluence\_AppRelocationInfo operation

**Service operation name:** Nnef\_TrafficInfluence\_AppRelocationInfo

**Description:** Forward the acknowledgement to the notification of UP path management event report to SMF.

**Inputs, Required:** Notification Correlation Information, cause code.

Cause code indicates whether the acknowledgement is a positive response or a negative response.

**Inputs, Optional:** N6 traffic routing information as described in clause 5.6.7 of TS 23.501 [2], Indication that buffering of uplink traffic should start, Information for EAS IP Replacement in 5GC.

**Outputs, Required:** None.

**Outputs, Optional:** None.

See clause 4.3.6.3 for details on usage of this service operation for example for the usage of the Indication that buffering of uplink traffic should start.

\* \* \* End Of Changes \* \* \*