**3GPP TSG- Meeting #**  ***S2-220abcd***

**Elbonia, October 10th-17th , 2022 (new CR)**

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| *CR-Form-v12.2* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
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|  | 23.502 | **CR** | ? | **rev** | **-** | **Current version:** | ? |  |
|  | | | | | | | | |
| *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:*** | Procedure update to support Service Function Chaining in 5GS | | | | | | | | | |
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| ***Source to WG:*** | Intel | | | | | | | | | |
| ***Source to TSG:*** |  | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | SFC | | | | |  | ***Date:*** | | | 2022-09-26 |
|  |  | | | |  | |  | | |  |
| ***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 can be 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-15 (Release 15) Rel-16 (Release 16) Rel-17 (Release 17) Rel-18 (Release 18) Rel-19 (Release 19)* | |
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| ***Reason for change:*** | | Based on the conclusion in TR 23.700-18, the changes listed below are proposed -   * Procedure for Processing AF requests to influence traffic routing for Sessions not identified by a UE address is updated to include support for Service Function Chaining. * Procedure for Transferring an AF request targeting an individual UE address to the relevant PCF is updated to include support for Service Function Chaining. * The input parameters for Npcf\_PolicyAuthorization\_Create service operation and Npcf\_PolicyAuthorization\_Update service operation is updated to include SFC ID and Metadata | | | | | | | | |
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| ***Summary of change:*** | | It is proposed to add a new clause for Service Function Chaining describing how how to enble AF to influence 5G traffic steering to support SFC. | | | | | | | | |
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| ***Consequences if not approved:*** | | SFC feature not supported in Rel-18. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 4.3.6.2, 4.3.6.4, 5.2.5.3.2, 5.2.5.3.3 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **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 Changes \* \* \*

#### 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.

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, TS 23.288 [50], to provide an updated list of DNAI(s) to the SMF.

The PCF evaluates whether the SFC ID correspond to an authorized SFC policy for the AF. If there is a match, the PCF notifies SMF via Npcf\_SMPolicyControl\_UpdateNotify message including 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].

If the PCC rule includes SFP IDs, then steps 6a, 6b, 6c, 6d are performed, otherwise these steps are skipped.

6a. The SMF select a UPF with SFC capability as described in clause 6.3.3 of TS 23.501 [2].

6b. When there is no established tunnel between UPF acting as PSA and UPF with SFC capability for this UE, the SMF requests allocation of two tunnel endpoints at the UPF acting as PSA (one tunnel per traffic direction).

6c. When there is no established tunnel between UPF acting as PSA and UPF with SFC capability for this UE, the SMF requests allocation of two tunnel endpoints at the UPF with SFC capability (one tunnel per traffic direction).

6d. Upon reception of the PCC rules from the PCF, the SMF may configure the UPF acting as PSA via N4 message including PDR and FAR.

6e. Upon reception of the PCC rules from the PCF, the SMF configures the UPF with SFC capability via N4 message including PDR and FARs.

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.

\* \* \* Next 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, 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 as defined in clause 4.3.6.2. 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]).

\* \* \* Next Changes \* \* \*

##### 5.2.5.3.2 Npcf\_PolicyAuthorization\_Create service operation

**Service operation name:** Npcf\_PolicyAuthorization\_Create

**Description:** Authorize the request, and optionally determines and installs SM Policy Control Data according to the information provided by the NF Consumer or provides Port Management Information Container for ports on DS-TT or NW-TT, or User plane node Management Information Container.

**Inputs, Required:** UE (IP or MAC) address, identification of the application session context.

**Inputs, Optional:** GPSI or SUPI if available, Internal Group Identifier, DNN if available, S-NSSAI if available, Media type, Media format, bandwidth requirements, sponsored data connectivity information if applicable, flow description, AF Application Identifier, AF Communication Service Identifier, AF Record Identifier, Flow status, Priority indicator, emergency indicator, ASP Identifier, resource allocation outcome, AF Application Event Identifier, a list of DNAI(s) and corresponding routing profile ID(s) or N6 traffic routing information, AF Transaction Id, Early and/or late notifications about UP path management events, temporal validity condition, spatial validity condition, Information for EAS IP Replacement in 5GC, AF indication for simultaneous connectivity over source and target PSA at edge relocation as described in clause 5.6.7 in 23.501 [2], Background Data Transfer Reference ID, priority sharing indicator as described in clause 6.1.3.15 in TS 23.503 [20], pre-emption control information as described in clause 6.1.3.15 in TS 23.503 [20], Port Management Information Container and related port number, User plane node Management Information Container, TSN AF parameters provided by the TSN AF to the PCF as described in clause 6.1.3.23 of TS 23.503 [20], Alternative QoS Related parameter set(s), QoS parameter(s) to be measured, Reporting frequency, Target of reporting and optional an indication of local event notification as described in clause 6.1.3.21 of TS 23.503 [20], individual QoS parameters as described in clause 6.1.3.22 of TS 23.503 [20], Alternative Service Requirements (containing one or more QoS reference parameters in a prioritized order), MPS for Data Transport Service indicator as described in clause 6.1.3.11 of TS 23.503 [20], SFC ID, Metadata.

**Outputs, Required:** Success or Failure (reason for failure, e.g. as defined in clauses 6.1.3.16 and clause 6.1.3.10 of TS 23.503 [20]).

**Outputs, Optional:** The service information that can be accepted by the PCF.

##### 5.2.5.3.3 Npcf\_PolicyAuthorization\_Update service operation

**Service operation name:** Npcf\_PolicyAuthorization\_Update

**Description:** Provides updated information to the PCF.

**Inputs, Required:** Identification of the application session context.

**Inputs, Optional:** Media type, Media format, bandwidth requirements, sponsored data connectivity information if applicable, flow description, AF Application Identifier, AF Communication Service Identifier, AF Record Identifier, Flow status, Priority indicator, resource allocation outcome, AF Application Event Identifier, a list of DNAI(s) and corresponding routing profile ID(s) or N6 traffic routing information, AF Transaction Id, Early and/or late notifications about UP path management events, temporal validity condition, spatial validity condition, Information for EAS IP Replacement in 5GC, 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], Background Data Transfer Reference ID, priority sharing indicator as described in clause 6.1.3.15 of TS 23.503 [20], pre-emption control information as described in clause 6.1.3.15 of TS 23.503 [20], Port Management Information Container and related port number, User plane node Management Information Container, TSN AF parameters provided by the TSN AF to the PCF as described in clause 6.1.3.23 of TS 23.503 [20], individual QoS parameters as described in clause 6.1.3.22 of TS 23.503 [20], Alternative Service Requirements (containing one or more QoS reference parameters in a prioritized order), Alternative QoS Related parameter set(s), QoS parameter(s) to be measured, Reporting frequency, Target of reporting and optional an indication of local event notification as described in clause 6.1.3.21 of TS 23.503 [20], MPS for Data Transport Service indicator as described in clause 6.1.3.11 of TS 23.503 [20], SFC ID, Metadata.

**Outputs, Required:** Success or Failure (reason for failure, e.g. as defined in clause 6.1.3.16 of TS 23.503 [20]).

**Outputs, Optional:** The service information that can be accepted by the PCF.

Provides updated application level information and communicates with Npcf\_SMPolicyControl service to determine and install the policy according to the information provided by the NF Consumer. Updates an application context in the PCF.

\* \* \* End of Changes \* \* \*