Use Case Description and Background for the proposed CR C3-243044

CEWiT

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Introduction & Background

- This presentation explains use case and background of the proposed CR C3-243043

- In 5G Core, the Network Exposure Function (NEF) provides services like Event Monitoring, AF Session QoS and Traffic Influence.

- The Traffic Influence API of NEF addresses a diverse set of use cases. One among these is an untrusted Application Function (AF) requesting for routing specific part(s) of data flow(s) of a UE's PDU Session between multiple Data Network Access Identifier (DNAIs) of the same Data Network (DN).

- In case of single DNAI being requested, the traffic identified by the filter or filters will be routed to the requested DNAI. In case of multiple DNAIs, the traffic identified by the filter or filters will be routed to the DNAI which is selected by the 5G Core.

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Introduction & Background contd...

Stage 2 reference corresponding to Traffic Influence from AF – Clause 5.6.7.1 of 3GPP 23.501, version 18.5.0

For each information element mentioned above in the AF request, the detailed description is as follows:

1) Information to identify the traffic. The traffic can be identified in the AF request by
   - Either a DNN and possibly slicing information (S-NSSAI) or an AF-Service-Identifier
     - When the AF provides an AF-Service-Identifier i.e. an identifier of the service on behalf of which the AF is issuing the request, the 5G Core maps this identifier into a target DNN and slicing information (S-NSSAI)
     - When the NEF processes the AF request the AF-Service-Identifier may be used to authorize the AF request.
   - An application identifier or traffic filtering information (e.g. IP 5 Tuple). The application identifier refers to an application handling UP traffic and is used by the UPF to detect the traffic of the application.

   When the AF request is for influencing SMF routing decisions, the information is to identify the traffic to be routed.

   When the AF request is for subscription to notifications about UP path management events, the information is to identify the traffic that the events relate to. The AF request may include a PLMN ID of the PLMN that the DNN and S-NSSAI belong to, as described in clause 4.3.6.1 of TS 23.502 [3].

2) Information about the N6 traffic routing requirements for traffic identified as defined in 1). This includes:
   - Information about the N6 traffic routing requirements that is provided per DNAI: for each DNAI, the N6 traffic routing requirements may contain a routing profile ID and/or N6 traffic routing information.
   - An optional indication of traffic correlation, when the information in 4) identifies a group of UEs. This implies the targeted PDU Sessions should be correlated by a common DNAI in the user plane for the traffic

Stage 2 reference for internal logic on interpretation for Traffic Influence use case – Clause 5.6.7.1 of 3GPP 23.501, version 18.5.0

The PCF, based on information received from the AF, operator's policy, optionally service experience analytics per UP path received from NWDAF, etc. authorizes the request received from the AF and determines for each DNAI, a traffic steering policy ID (derived from the routing profile ID provided by the AF) and/or the N6 traffic routing information (as provided by the AF) to be sent to the SMF as part of the PCC rules. The traffic steering policy IDs are configured in the SMF or in the UPF. The traffic steering policy IDs are related to the mechanism enabling traffic steering to the DN.

The DNAIs are related to the information considered by the SMF for UPF selection and (I-)SMF (re)selection, e.g. for diverting (locally) some traffic matching traffic filters provided by the PCF.

The PCF acknowledges a request targeting an individual PDU Session to the AF or to the NEF.

For PDU Session that corresponds to the AF request, the PCF provides the SMF with a PCC rule that is generated based on the AF request, Local routing indication from the PDU Session policy control subscription information and taking into account UE location presence in area of interest (i.e. Presence Reporting Area). The PCC rule contains the information to identify the traffic, information about the DNAI(s) towards which the traffic routing should apply and optionally, an indication of traffic correlation and/or an indication of application relocation possibility and/or indication of UE IP address preservation. The PCC rule also contains per DNAI a traffic steering policy ID and/or N6 traffic routing information, if the N6 traffic routing information is explicitly provided in the AF request.

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Introduction & Background contd...

- In the request, AF can provide filters to identify single or multiple flows and routes to indicate single or list of DNAIs using attributes *trafficFilters* and *trafficRoutes*
  - Ref. Table 5.4.3.3.2-1 and 5.4.3.3.3-1 3GPP TS 29.522, version 18.5.0
  - TrafficFilters provide information about which data flow must be routed and TrafficRoutes provide information about where the data flow must be routed

trafficFilters	array(FlowInfo)	O	1..N	Identifies IP packet filters. (NOTE 3)	
ethTrafficFilters	array(EthFlowDescription)	O	1..N	Identifies Ethernet packet filters. (NOTE 3)	
trafficRoutes	array(RouteToLocation)	O	1..N	Identifies the N6 traffic routing requirement. (NOTE 9)	

NOTE 3: One of "afAppId", "trafficFilters" or "ethTrafficFilters" shall be included.

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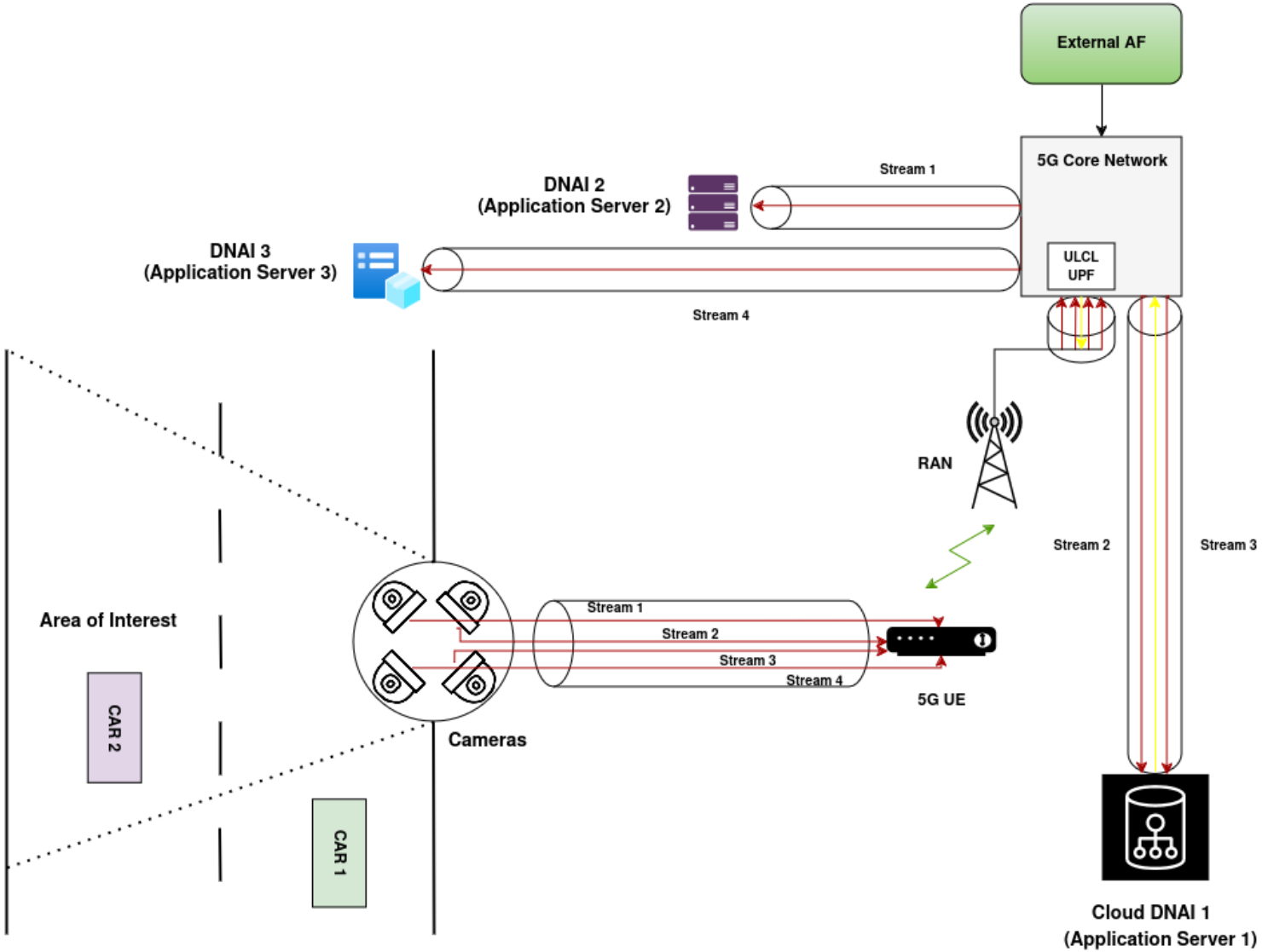
Use Case



Description of Use Case :

- Figure presents a use case, where the feeds from multiple security cameras are routed to a Data Network through the 5G Network
- An Application Function, processing the camera feeds at different DNAIs, can request the 5G Core for dynamic routing of the same for specific purpose like video analytics and/or load sharing
- For dynamic routing requirements, AF would interact with 5G Core via NEF by invoking Nnef_TrafficInfluence API
- For the existing routing requirements, as illustrated in the figure, AF requests multiple traffic filters to identify each stream and routing information for routing each stream to a different DNAI

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Problem Statement

Multiple routing requirement for different flows in a single request:

- Both attributes trafficFilters and trafficRoutes are of data type array and do not carry any mapping between them

- Thus, in AF request, filters1 and filters2 are packed into a single array of trafficFilters and DNAI1 and DNAI2 are packed into a single array of trafficRoutes

- NEF on receiving this request, interprets the information as traffic identified by filters1 and filters2 to be routed to either DNAI1 or DNAI2 as decided by 5G core which doesn't match with AF's requirement

- This can be met with multiple requests from AF, each carrying a single routing requirement. It is not an optimized approach as it adds up multiple subscriptions in all 5G Core NFs involved – NEF, PCF, UDR, SMF

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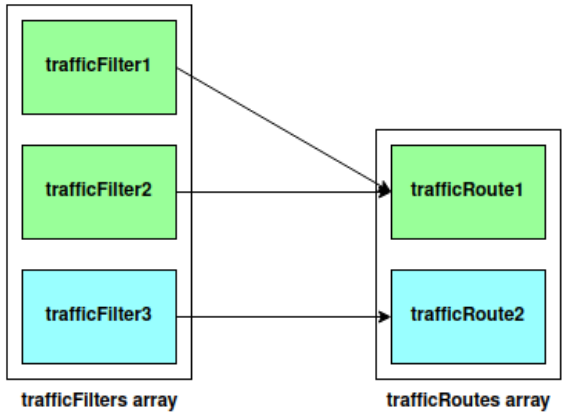
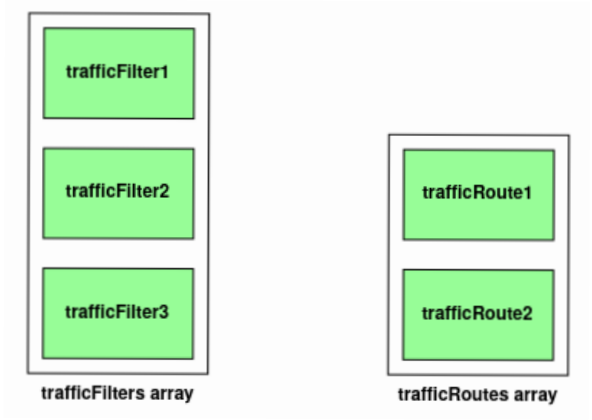
Problem Statement Expansion

- For example, let's assume the AF's intention which is as follows,

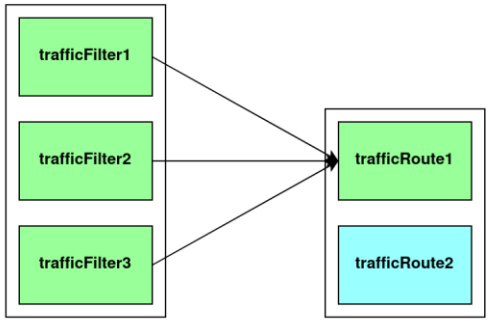


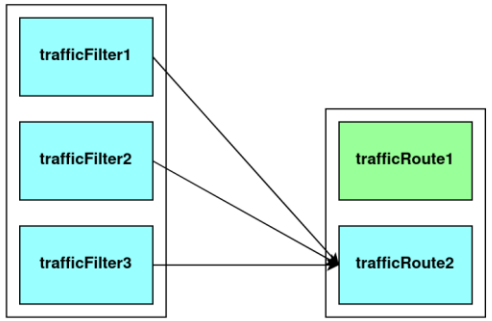
This is the AF's intention



The two arrays will look like this as two independent information when NEF receives the request

- But the action taken by the 5G Core can be one of the possible ways listed below





AF's requirement is not met by the 5G Core due to lack of clarity in the request

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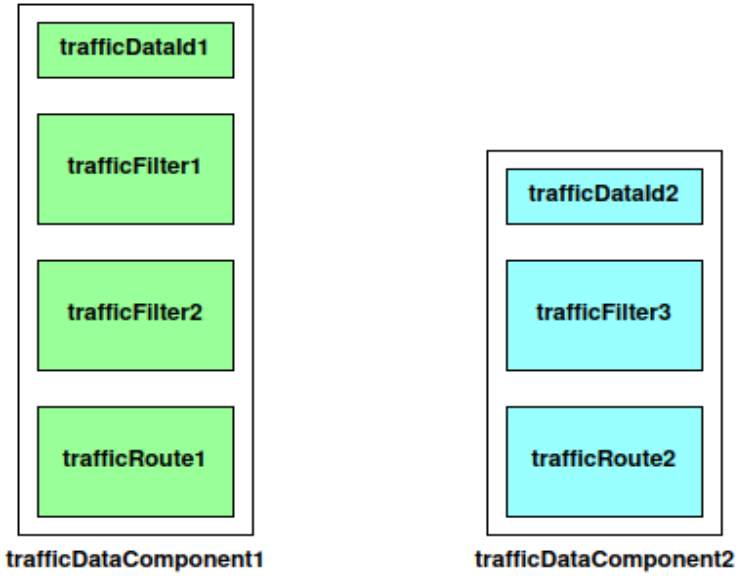
Proposed Solution

- Adding a new attribute with datatype as a map shall address this problem
- This attribute contains trafficFilters / ethTrafficFilters and mapping trafficRoutes
- Multiple entries can be present in the new attribute which holds sets of trafficFilters / ethTrafficFilters and trafficRoutes and NEF receives the data as shown in the figure



The new attribute can be used for providing multiple traffic routing requirements. The existing attributes trafficFilters and trafficFilters can continue to be used for providing single traffic routing requirement

This new attribute can be added in 5.4.3.3.2-1 and 5.4.3.3.3-1 as provided below

Attribute name	Data type	P	Cardinality	Description	Applicability
trafficData	map(TrafficDataComponent)	O	1...N	Describes the Traffic Data Component information. The key of the map is the attribute trafficDataId.(NOTE 11)	MultiRouteReq

Note : The applicability MultiRouteReq is added in Used Features clause of the specification as "This feature indicates the support for AF providing Multiple Route requirements."

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Data type TrafficDataComponent

Attribute name	Data type	P	Cardinality	Description	Applicability
trafficDataId	string	M	1	Identifies the traffic data component containing the ordinal number.	
trafficFilters	array(FlowInfo)	O	1..N	Identifies IP packet filters. (NOTE)	
ethTrafficFilters	array(EthFlowDescription)	O	1..N	Identifies Ethernet packet filters. (NOTE)	
trafficRoutes	array(RouteToLocation)	O	1..N	Identifies the N6 traffic routing requirement.	
NOTE: One of "trafficFilters" or "ethTrafficFilters" shall be included.					

- **Note : The other attributes in TrafficInfluSub as defined in 5.4.3.3.2 and TrafficInfluSubPatch as defined in 5.4.3.3.3 having impact over existing trafficFIlters and trafficRoutes shall be applicable to the attributes trafficFilters and trafficRoutes in the new data type TrafficDataComponent also.**

*** The End ***

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