**3GPP TSG- Meeting #**

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| *CR-Form-v12.3* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
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|  |  | **CR** |  | **rev** |  | **Current version:** |  |  |
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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:*** | Nnef\_VFLTraining service operation descriptions | | | | | | | | | |
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| ***Source to WG:*** | , vivo | | | | | | | | | |
| ***Source to TSG:*** |  | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | AIML\_CN | | | | |  | ***Date:*** | | |  |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **B** |  | | | | | ***Release:*** | | |  |
|  | *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-17 (Release 17) Rel-18 (Release 18) Rel-19 (Release 19)  Rel-20 (Release 20)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | 23.288 clause 12.2 defines the Nnef\_VFLTraining API, which enables an Untrusted AF acting as a VFL server to request from an NWDAF to act as a VFL client, as described in detail in 23.288 clause 6.2H. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | Defined the service operation descriptions for the Nnef\_VFLTraining API. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | Not fulfilled stage 2 requirements and non workable end-to-end VFL procedures. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 3.2, 4.1, 4.4.50 (new, including subclauses) | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **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 does not impact any OpenAPI file. | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

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

3.2 Abbreviations

For the purposes of the present document, the abbreviations given in 3GPP TR 21.905 [1] and the following apply. An abbreviation defined in the present document takes precedence over the definition of the same abbreviation, if any, in 3GPP TR 21.905 [1].

5G-RG 5G Residential Gateway

A-KID AKMA Key IDentifier

A-TID AKMA Temporary UE IDentifier

A2X Aircraft-to-Everything

AAnF AKMA Anchor Function

ACS Auto-Configuration Server

ADM AIoT Data Management

AI/ML Artificial Intelligence/Machine Learning

AIoT Ambient IoT

AF Application Function

AKMA Authentication and Key Management for Applications

AM Access and Mobility management

ASTI Access Stratum TIme distribution

BAT Burst Arrival Time

BDT Background Data Transfer

CAPIF Common API Framework

CP Communication Pattern

DN Data Network

DNAI DN Access Identifier

DNN Data Network Name

EAS Edge Application Server

ECS Edge Configuration Server

EHE Edge Hosting Environment

FQDN Fully Qualified Domain Name

GMLC Global Mobile Location Centre

GPSI Generic Public Subscription Identifier

IPTV Internet Protocol Television

KAF AKMA Application Key

MBS Multicast/Broadcast Service

MB-SMF Multicast/Broadcast Session Management Function

MCC Mobile Country Code

MNC Mobile Network Code

MO-LR Mobile Originated Location Request

MoQ Media over QUIC

MPS Multimedia Priority Service

NAT Network Address Translation

NAPT Network Address Port Translation

NEF Network Exposure Function

NSAC Network Slice Admission Control

NSACF Network Slice Admission Control Function

PCF Policy Control Function

PEGC PIN Element with Gateway Capability

PCRF Policy and Charging Rule Function

PDTQ Planned Data Transfer with QoS requirements

PFD Packet Flow Description

PFDF Packet Flow Description Function

PIN Personal IoT Network

QUIC Quick UDP Internet Connections

RCD Rich Call Data

REST Representational State Transfer

RNAA Resource owner-aware Northbound API Access

RSLPPI Ranging and SideLink Positioning Privacy Indication

SCEF Service Capability Exposure Function

SFC Service Function Chain

S-NSSAI Single Network Slice Selection Assistance Information

SSM Source Specific IP Multicast address

TAI Traffic Area Identity

TMGI Temporary Mobile Group Identity

TNAP Trusted Network Access Point

TSC Time Sensitive Communication

TSCAI Time Sensitive Communication Assistance Information

TSCTSF Time Sensitive Communication and Time Synchronization Function

TTNB Time To Next Burst

UAS Uncrewed Aerial System

UAV Uncrewed Aerial Vehicle

UDP User Datagram Protocol

UDR Unified Data Repository

UP User Plane

UPF User Plane Function

URSP UE Route Selection Policy

USS UAS Service Supplier

VFL Vertical Federated Learning

WB Wide Band

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

4.1 Overview

The NEF Northbound interface is between the NEF and the AF. It specifies RESTful/RPC APIs that allow the AF to access the services and capabilities provided by 3GPP network entities and securely exposed by the NEF.

This document also specifies the procedures triggered at the NEF by API requests from the AF and by event notifications received from 3GPP network entities.

The stage 2 level requirements and signalling flows for the NEF Northbound interface are defined in 3GPP TS 23.502 [2], 3GPP TS 23.247 [53] for MBS specific aspects, 3GPP TS 26.531 [59] for data reporting provisioning and Media Streaming Event Exposure specific aspects, 3GPP TS 23.256 [77] for UAS aspects, 3GPP TS 23.228 [79] for IMS aspects, 3GPP TS 23.369 [81] for AIoT aspects, and 3GPP TS 23.288 [29] for VFL specific aspects.

The NEF Northbound interface supports the following procedures:

1) Procedures for Monitoring.

2) Procedures for Device Triggering.

3) Procedures for resource management of Background Data Transfer.

4) Procedures for CP Parameters, Network Configuration Parameters Provisioning, 5G LAN Parameters Provisioning, ACS Configuration Parameter Provisioning, Location Privacy Indication Parameters Provisioning, ECS address provisioning, Slice Parameters Provisioning, DNN and S-NSSAI specific Group Parameters Provisioning, Ranging and SideLink Positioning Privacy Indication (RSLPPI) Parameters Provisioning, Addressing Parameters Provisioning and CAG Information Parameters Provisioning.

5) Procedures for PFD Management.

6) Procedures for Traffic Influence.

7) Procedures for changing the chargeable party at session set up or during the session.

8) Procedures for AF required QoS.

9) Procedures for MSISDN-less Mobile Originated SMS.

10) Procedures for non-IP data delivery.

11) Procedures for analytics information exposure.

12) Procedure for applying BDT policy.

13) Procedures for Enhanced Coverage Restriction Control.

14) Procedures for IPTV Configuration.

15) Procedures for Service Parameter Provisioning.

16) Procedures for RACS Parameter Provisioning.

17) Procedures for Mobile Originated Location Request.

18) Procedures for AKMA.

19) Procedures for AF triggered Access and Mobility Influence.

20) Procedures for AF triggered Access and Mobility Policy Authorization.

21) Procedures for Time Synchronization Exposure.

22) Procedures for EAS Deployment information provisioning.

23) Procedures for TMGI allocation, deallocation, expiry timer refresh and timer expiry notification.

24) Procedures for MBS session management and MBS parameters provisioning.

25) Procedures for Data Reporting.

26) Procedures for Data Reporting Provisioning.

27) Procedures for AF specific UE ID retrieval.

28) Procedures for Media Streaming Event Exposure.

29) Procedures for MBS User Service management.

30) Procedures for MBS User Data Ingest Session management.

31) Procedures for MBS Group Message Delivery management.

32) Procedures for DNAI mapping.

33) Procedures for negotiation of Planned Data Transfer with QoS requirements.

34) Procedures for Member UE Slection Assistance.

37) Procedures for UE Address retrieval.

38) Procedures for ECS Address configuration in roaming.

39) Procedures for UAV Flight Assistance.

40) Procedures for UAV Flight information retrieval.

41) Procedures for IMS session management with data channel.

42) Procedures for IMS Event Exposure (EE) Services.

43) Procedures for IMS Parameters Provisioning.

44) Procedures for AIoT Management.

45) Procedures for VFL Training.

Which correspond to the following services respectively, supported by the NEF as defined in 3GPP TS 23.502 [2], 3GPP TS 23.247 [53], 3GPP TS 26.531 [59], 3GPP TS 23.256 [77], 3GPP TS 23.228 [79], 3GPP TS 23.369 [81], or 3GPP TS 23.288 [29]:

1) Nnef\_EventExposure service and Nnef\_APISupportCapability service.

2) Nnef\_Trigger service.

3) Nnef\_BDTPNegotiation service.

4) Nnef\_ParameterProvision service.

5) Nnef\_PFDManagement service.

6) Nnef\_TrafficInfluence service.

7) Nnef\_ChargeableParty service.

8) Nnef\_AFsessionWithQoS service and Nnef\_AF\_Request\_for\_QoS service.

9) Nnef\_MSISDN-less\_MO\_SMS service.

10) Nnef\_NIDDConfiguration and Nnef\_NIDD services.

11) Nnef\_AnalyticsExposure service.

12) Nnef\_ApplyPolicy service.

13) Nnef\_ECRestriction service.

14) Nnef\_IPTVConfiguration service.

15) Nnef\_ServiceParameter service.

16) Nnef\_UCMFProvisioning service.

17) Nnef\_Location service.

18) Nnef\_AKMA service.

19) Nnef\_AMInfluence service.

20) Nnef\_AMPolicyAuthorization service.

21) Nnef\_TimeSynchronization and Nnef\_ASTI services.

22) Nnef\_EASDeployment service.

23) Nnef\_MBSTMGI service.

24) Nnef\_MBSSession service.

25) Nnef\_DataReporting service.

26) Nnef\_DataReportingProvisioning service.

27) Nnef\_UEId service.

28) Nnef\_MSEventExposure service.

29) Nnef\_MBSUserService service.

30) Nnef\_MBSUserDataIngestSession service.

31) Nnef\_MBSGroupMsgDelivery service.

32) Nnef\_DNAIMapping service.

33) Nnef\_PDTQPolicyNegotiation service.

34) Nnef\_MemberUESelectionAssistance service.

37) Nnef\_UEAddress service.

38) Nnef\_ECSAddress service.

39) Nnef\_UAVFlightAssistance service.

40) Nnef\_RetrieveInfoUAVFlight service.

41) Nnef\_ImsSessionManagement service.

42) Nnef\_ImsEventExposure service.

43) Nnef\_ImsParameterProvision service.

44) Nnef\_AIoT service.

45) Nnef\_VFLTraining.

NOTE 1: For the Nnef\_PFDManagement service, only the Nnef\_PFDManagement\_Create/Update/Delete service operations are applicable for the NEF Northbound interface.

NOTE 2: For the Nnef\_NIDD service, NF consumer other than the AF does not use the NEF Northbound interface.

NOTE 3: For the Nnef\_NIDDConfiguration service, the Nnef\_NIDDConfiguration\_Trigger service operation is only applicable for the NEF Northbound interface.

NOTE 4: The Nnef\_APISupportCapability service is only applicable in the MonitoringEvent API when the monitoring type is set to "API\_SUPPORT\_CAPABILITY".

NOTE 5: The Nnef\_MSEventExposure service maps to the Nnef\_EventExposure service and is applicable for the case where the event consumer AF in the Application Service Provider is deployed outside the trusted domain, as described in 3GPP TS 26.531 [59], and the subscribed event is set to "MS\_QOE\_METRICS", "MS\_CONSUMPTION", "MS\_NET\_ASSIST\_INVOCATION", "MS\_DYN\_POLICY\_INVOCATION", or "MS\_ACCESS\_ACTIVITY".

NOTE 6: The stage 2 Nnef\_AF\_Request\_for\_QoS API is defined by reusing the Nnef\_AFsessionWithQoS API together with the support of the "GMEC" feature.

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

4.4.50 Procedures for VFL Training

4.4.50.1 General

These procedures are used by the AF to provide, create, update, or delete VFL Training subscriptions to the NEF, which authorizes them and subscribes accordingly to an NWDAF. They are also used to provide received notifications to the AF.

4.4.50.2 Creation of new VFL Training subscription

In order to create a new "Individual VFL Training Subscription" resource, the AF shall initiate an HTTP POST request to the NEF for the "VFL Training Subscriptions" resource. The HTTP POST request message body shall include the VflTrainingSubs data structure with contents as described in clause 5.46.5.3.2.

Upon receipt of the corresponding HTTP POST message, the NEF authorizes the request and upon successful authorization, the NEF shall determine the internal identifier of the targetted NWDAF based on the provided external NWDAF identifier and interact with the NWDAF by using the Nnwdaf\_VFLTraining\_Subscribe service operation as defined in 3GPP TS 29.520 [27]. If the request is accepted by the NWDAF, the NEF shall create a new "Individual VFL Training Subscription" resource and send an HTTP "201 Created" response with the VflTrainingSubs data structure including the contents of the created "Individual VFL Training Subscription" resource in the response body and a Location header field containing the URI of the created "Individual VFL Training Subscription" resource. If the NEF receives an error response from the NWDAF, the NEF shall not create the resource and shall respond to the AF with a proper error status code. If the NEF received within an error response a "ProblemDetails" data structure with a "cause" attribute indicating an application error, the NEF shall relay this error response to the AF with a corresponding application error, if applicable.

4.4.50.3 Modification of existing Individual VFL Training Subscription

In order to modify an existing "Individual VFL Training Subscription" resource, the AF shall initiate an HTTP PUT or PATCH request to the "Individual VFL Training Subscription" resource. In the case of HTTP PUT, the request body shall include the VflTrainingSubs data structure, which shall include the same contents as described in clause 5.46.5.3.2. In the case of HTTP PATCH, the request body shall include the VflTrainingSubsPatch data structure with the contents as defined in clause 5.46.5.3.3.

Upon receipt of the corresponding HTTP PUT (or PATCH) request message, the NEF authorizes the request and upon successful authorization, the NEF shall interact with the NWDAF by using the Nnwdaf\_VFLTraining\_Subscribe service operation as defined in 3GPP TS 29.520 [27]. If the request is accepted by the NWDAF, the NEF shall update the "Individual VFL Training Subscription" resource and send an HTTP "200 OK" response with the VflTrainingSubs data structure including the contents of the updated "Individual VFL Training Subscription" resource in the response body or an HTTP "204 No Content" response. If the NEF receives an error response from the NWDAF, the NEF shall not update the resource and shall respond to the AF with a proper error status code. If the NEF received within an error response a "ProblemDetails" data structure with a "cause" attribute indicating an application error, the NEF shall relay this error response to the AF with a corresponding application error, if applicable.

4.4.50.4 Deletion of existing Individual VFL Training Subscription

In order to delete an existing "Individual VFL Training Subscription" resource, the AF shall send an HTTP DELETE request message to the NEF targetting the URI of this "Individual VFL Training Subscription" resource. If the request is authorized, the NEF shall interact with the NWDAF using Nnwdaf\_VFLTraining\_Unsubscribe service operation as defined in 3GPP TS 29.520 [27].

After receiving a successful response from the NWDAF, the NEF shall delete the "Individual VFL Training Subscription" resource and shall respond to the AF with an HTTP "204 No Content" response message.

If the NEF receives an error response from the NWDAF, the NEF shall take proper error handling actions and shall respond to the AF with a proper error status code. If the NEF received within an error response a "ProblemDetails" data structure with a "cause" attribute indicating an application error, the NEF shall relay this error response to the AF with a corresponding application error, when applicable.

4.4.50.5 Handling of VFL Training Notifications

Upon receiving a VFL Training notification from the NWDAF as defined in 3GPP TS 29.520 [27], the NEF shall notify the AF accordingly be performing an HTTP POST request towards the notification URI that was provided by the AF during the creation or modification of the subscription, including the VflTrainingNotify data structure in the message body.

Upon reception of this notification request, the AF shall acknowledge its successful reception by returning an HTTP "204 No Content" status code. On failure, the AF shall take proper error handling actions, as specified in clause 5.46.7, and respond to the NEF with an appropriate error status code.

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