**3GPP SA WG Meeting #105 SP-241306**

**10 - 13 September 2024, Melbourne, Australia**

**SA WG2 Meeting #164 S2-2409314**

**Maastricht, Netherlands, 19 August – 23 August, 2024 (revision of S2-2407707)**

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| --- |
| *CR-Form-v12.1* |
| **CHANGE REQUEST** |
|  |
|  |  **23.502** | **CR** | **4865** | **rev** | **4** | **Current version:** | **19.0.0** |  |
|  |
| *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:***  | Enhancement of getting public UE IP address and port number |
|  |  |
| ***Source to WG:*** | China Mobile, Ericsson, Nokia, ZTE, Huawei, Samsung |
| ***Source to TSG:*** | ZTE, China Mobile, Ericsson, Nokia, Huawei, Samsung |
|  |  |
| ***Work item code:*** | UPEAS\_Ph2 |  | ***Date:*** | 2024-07-16 |
|  |  |  |  |  |
| ***Category:*** | **B** |  | ***Release:*** | Rel-19 |
|  | *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:*** | According to the R19 UPEAS\_ph2 conclusion, the following aspects are concluded as principles for normative work:- UPF event exposure service is enhanced to allow NF consumer to obtain one NATed UE public IP address and Port for a particular PDU Session from the SMF and UPF, based on the private UE IP address allocated by 5GC.- The remote end IP address is mandatory input for the above to avoid exposing the full NAT mapping for a UE.This paper proposes to enhance the function of UPF to support to obtain the public UE IP address and port number |
|  |  |
| ***Summary of change:*** | Enhance the UPF event exposure with supporing to get the public UE IP address.  |
|  |  |
| ***Consequences if not approved:*** | If NAT deployed in network, there exists the mapping table between internal private UE IP address (used in 5GC internally) and public UE IP address used in application server. |
|  |  |
| ***Clauses affected:*** | 5.2.6.1,5.2.26.2.1, 5.2.26.2.3, 5.2.6.36.1, 5.2.6.36.2, 5.2.6.36.3(new), 5.2.6.36.4(new), 5.2.6.36.5(new), |
|  |  |
|  | **Y** | **N** |  |  |
| ***Other specs*** |  | **X** |  Other core specifications  |  |
| ***affected:*** |  | **X** |  Test specifications |  |
| ***(show related CRs)*** |  | **X** |  O&M Specifications |  |
|  |  |
| ***Other comments:*** | 6.2.8.2.4.x of TS 23.288 is related with CR1165 |
|  |  |
| ***This CR's revision history:*** | Rev 4:Revoke the changes on Nnef\_UEAddress\_Get service optionAdd new Nnef\_UEAddress\_Subscribe/Unsubscribe/Notify service operation  |

\* \* \* Start of Change \* \* \*

#### 5.2.6.1 General

The following table shows the NEF Services and Service Operations:

Table 5.2.6.1-1: NF Services provided by the NEF

|  |  |  |  |
| --- | --- | --- | --- |
| Service Name | Service Operations | OperationSemantics | Example Consumer(s) |
| **Nnef\_EventExposure** | Subscribe | Subscribe/Notify | AF, NWDAF |
|  | Unsubscribe |  | AF, NWDAF |
|  | Notify |  | AF, NWDAF |
| **Nnef\_PFDManagement** | Fetch | Request/Response | SMF |
|  | Subscribe | Subscribe/Notify | SMF |
|  | Notify |  | SMF |
|  | Unsubscribe |  | SMF |
|  | Create | Request/Response | AF |
|  | Update | Request/Response | AF |
|  | Delete | Request/Response | AF |
| **Nnef\_EASDeployment** | Create | Request/Response | AF |
|  | Update | Request/Response | AF |
|  | Delete | Request/Response | AF |
|  | Subscribe | Subscribe/Notify | SMF |
|  | Unsubscribe |  | SMF |
|  | Notify |  | SMF |
| **Nnef\_ECSAddress** | Create | Request/Response | AF |
|  | Update | Request/Response | AF |
|  | Delete | Request/Response | AF |
|  | Subscribe | Subscribe/Notify | SMF |
|  | Unsubscribe |  | SMF |
|  | Notify |  | SMF |
| **Nnef\_TrafficInfluenceData** | Subscribe | Subscribe/Notify | SMF |
|  | Unsubscribe |  | SMF |
|  | Notify |  | SMF |
| **Nnef\_ParameterProvision** | Update | Request/Response | AF |
|  | Create | Request/Response | AF |
|  | Delete | Request/Response | AF |
|  | Get | Request/Response | AF |
| **Nnef\_Trigger** | Delivery | Request/Response | AF |
|  | DeliveryNotify | Subscribe/Notify | AF |
| **Nnef\_BDTPNegotiation** | Create | Request/Response | AF |
|  | Update | Request/Response | AF |
|  | Notify |  | AF |
| **Nnef\_TrafficInfluence** | Create | Request/Response | AF |
|  | Update | Request/Response | AF |
|  | Delete | Request/Response | AF |
|  | Get | Request/Response | AF |
|  | Notify | Subscribe/Notify | AF |
|  | AppRelocationInfo | Subscribe/Notify | AF |
| **Nnef\_ChargeableParty** | Create | Request/Response | AF |
|  | Update | Request/Response | AF |
|  | Notify | Request/Response | AF |
| **Nnef\_AFsessionWithQoS** | Create | Request/Response | AF |
|  | Notify | Request/Response | AF |
|  | Update | Request/Response | AF |
|  | Revoke | Request/Response | AF |
| **Nnef\_MSISDN-less\_MO\_SMS** | Notify | Notify | AF |
| **Nnef\_ServiceParameter** | Create | Request/Response | AF |
|  | Update | Request/Response | AF |
|  | Delete | Request/Response | AF |
|  | Get | Request/Response | AF |
| **Nnef\_APISupportCapability** | Subscribe | Subscribe/Notify | AF |
|  | Unsubscribe | Subscribe/Notify | AF |
|  | Notify | Subscribe/Notify | AF |
| **Nnef\_NIDDConfiguration** | Create | Request/Response | AF |
|  | TriggerNotify | Subscribe/Notify | AF |
|  | UpdateNotify | Subscribe/Notify | AF |
|  | Delete | Request/Response | AF |
| **Nnef\_NIDD** | Delivery | Request/Response | AF |
|  | DeliveryNotify | Subscribe/Notify | AF |
|  | GroupDeliveryNotify | Notify | AF |
| **Nnef\_SMContext** | Create | Request/Response | SMF |
|  | Delete | Request/Response | SMF |
|  | DeleteNotify | Subscribe/Notify | SMF |
|  | Delivery | Request/Response | SMF |
| **Nnef\_AnalyticsExposure** | Subscribe | Subscribe/Notify | AF |
|  | Unsubscribe |  | AF |
|  | Notify |  | AF |
|  | Fetch | Request/Response | AF |
| **Nnef\_UCMFProvisioning** | Create | Request/Response | AF |
|  | Delete | Request/Response | AF |
|  | Update | Request/Response | AF |
| **Nnef\_ECRestriction** | Get | Request/Response | AF |
|  | Update | Request/Response | AF |
| **Nnef\_ApplyPolicy** | Create | Request/Response | AF |
|  | Update | Request/Response | AF |
|  | Delete | Request/Response | AF |
| **Nnef\_Location** | LocationUpdateNotify | Notify | AF |
| **Nnef\_TimeSynchronization** | ConfigUpdate | Request/Response | AF |
|  | ConfigCreate | Request/Response | AF |
|  | ConfigDelete | Request/Response | AF |
|  | ConfigUpdateNotify | Subscribe/Notify | AF |
|  | CapsSubscribe | Subscribe/Notify | AF |
|  | CapsUnsubscribe | Subscribe/Notify | AF |
|  | CapsNotify | Subscribe/Notify | AF |
| **Nnef\_ASTI** | Create | Request/Response | AF |
|  | Update | Request/Response | AF |
|  | Delete | Request/Response | AF |
|  | Get | Request/Response | AF |
|  | UpdateNotify | Subscribe/Notify | AF |
| **Nnef\_AMPolicyAuthorization** | Create | Request/Response | AF |
|  | Update | Request/Response | AF |
|  | Delete | Request/Response | AF |
|  | Notify | Subscribe/Notify | AF |
|  | Subscribe |  | AF |
|  | Unsubscribe |  | AF |
| **Nnef\_AMInfluence** | Create | Request/Response | AF |
|  | Update | Request/Response | AF |
|  | Delete | Request/Response | AF |
|  | Notify | Subscribe/Notify | AF |
| **Nnef\_UEId** | Get | Request/Response | AF, V-NEF |
|  | UeIdMappingGet | Request/Response | GMLC |
|  | UeIdMappingCreate | Request/Response | AF |
|  | UeIdMappingUpdate | Request/Response | AF |
|  | UeIdMappingDelete | Request/Response | AF |
| **Nnef\_SMService** | MoForwardSm | Request/Response | SMS-SC |
| **Nnef\_PDTQPolicyNegotiation** | Create | Request/Response | AF |
|  | Update | Request/Response | AF |
|  | Notify |  | AF |
| **Nnef\_MemberUESelectionAssistance** | Subscribe | Subscribe/Notify | AF |
|  | Unsubscribe |  | AF |
|  | Notify |  | AF |
| **Nnef\_AF\_request\_for\_QoS** | Create | Request/Response | AF |
|  | Notify | Request/Response | AF |
|  | Update | Request/Response | AF |
|  | Revoke | Request/Response | AF |
| **Nnef\_DNAIMapping** | Subscribe | Subscribe/Notify | AF, NWDAF |
|  | Unsubscribe |  | AF, NWDAF |
|  | UpdateNotify |  | AF, NWDAF |
| **Nnef\_UEAddress** | Get | Request/Response | AF |
| Subscribe | Subscribe/Notify | AF |
| Unsubscribe | AF |
| Notify | AF |

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

##### 5.2.26.2.1 General

**Service description:** This service can expose UPF related information to other NFs. There are several operations for this service:

- Notifying events on the PDU Session to the NFs.

- Allow consumer NFs to subscribe and unsubscribe for an Event ID on UPF.

The following events can be notified to a NF consumer:

- QoS Monitoring. This event provides QoS Flow level performance information and can be used for direct event notification of QoS Monitoring reports to a different NF than the SMF as defined in clause 5.8.2.18 of TS 23.501 [2], or it may be for UPF Data collection by NWDAF for analytics (see TS 23.288 [50]) as described in clause 4.15.4.5.

 Subscription to this event is always indirect via SMF. The subscription specifies the type of measurement that is being requested. A combination of the information listed below can be requested.

 UPF and SMF interact using Session Reporting Rules as defined in clause 5.8.5.11 of TS 23.501 [2].

 The event notification may contain following information:

- QoS monitoring result for the QoS monitoring parameter(s) defined in clause 5.45 of TS 23.501 [2], e.g. UL packet delay, DL packet delay, or round trip packet delay.

- Indication of QoS Flow associated with the default QoS Rule (if requested by SMF, see clause 4.15.4.5.1).

- User Data Usage Measures or User Data Usage Trends. These events provide information about traffic matching Event Filter Information (see below) for a user's PDU Session or for each PDU Session served by the UPF. It can be used for UPF Data Collection by NWDAF for analytics (see TS 23.288 [50]) as described in clause 4.15.4.5.

 SMF shall use Service Based Interface subscription service operation to subscribe this UPF event. Other direct consumers can subscribe directly to UPF under the conditions defined in clause 5.8.2.17 of TS 23.501 [2]. The subscription request contains the Type of Measurement that is being requested, the Target of Event Reporting and the Event Filter Information (which describes the target traffic) and the required Granularity of Measurement. The Target of Event Reporting can be either a specific PDU Session or "any UE". The Event Filter Information may contain one or more of the following parameters: DNN, S-NSSAI, either Application ID(s) or Traffic Filtering Information. The Granularity of Measurement can indicate per data flow, per application, or per PDU Session. A combination of the information listed below for User Data Usage Measures can be requested.

 For User Data Usage Measures, the event notification may contain following event related information:

- Volume Measurement: measurements of data volume exchanged (UL, DL and/or overall) and/or number of packets exchanged (UL, DL and/or overall) determined for the requested Granularity of Measurement.

- Throughput Measurement: measurements of data throughput (UL and DL) determined for the requested Granularity of Measurement.

- Application related Information: URL(s) and/or Domain information (domain name and protocol) detected for the target traffic. This Type of Measurement requires that Application Id(s) or Traffic Filtering Information is provided (i.e. this measurement is not possible to be applied for all traffic handled by the UPF).

 For User Data Usage Trends, the event notification may contain following event related information:

- Throughput Statistic Measurement (average and/or peak throughput) over the measurement period determined for the requested Granularity of Measurement.

 For User Data Usage Measures and User Data Usage Trends, if the subscription is targeting any UE, the UPF shall perform the requested measurements for every PDU Session that matches the Event Filter Information and send the information per PDU Session, including the DNN and S-NSSAI and optionally, the sampling ratio achieved by the UPF. When the subscription requests that information is provided per data flow, the notification includes the Packet Filter Set and the Applications Identifier, if available.

NOTE 1: If the Target of Event Reporting is "any UE", care needs to be taken with regards to load and major signalling impacts and it is expected that the subscription request contains Event Filter Information and appropriate Event Reporting Information (like Sampling ratio and Partitioning criteria, see Table 4.15.1-1) in order to minimize the UPF performance impact of the per PDU Session measurement.

NOTE 2: The UPF can combine information for different PDU Sessions into one notification message (see TS 29.564 [93]).

- TSC management information (UMIC, PMIC, NW-TT port number) as defined in clause 5.8.5.14 of TS 23.501 [2].

 TSC management information event can be the result of an implicit subscription of the PCF on behalf of the TSNAF/TSCTSF via the Npcf\_SMPolicyControl service as described in clause 5.28 of TS 23.501 [2].

- UE NAT mapping. This event supports the NF consumer to subscribe this UPF event to obtain the public UE IP address and port number with the parameters of private UE address, an IP address(es) of the remote end, DNN and S-NSSAI associated with the AF ID, as well as the IP domain. as defined in clause 5.8.2.17 of TS 23.501[2].

If the consumer of UPF service is NWDAF and the target of UE is any UE, according to the Analytic ID from consumer, the NWDAF can decide which kind of information should be collect from UPF and event ID to use. Subscription may be performed directly towards UPF or via SMF as described in clause 5.8.2.17 of TS 23.501 [2]. The UPF collects the data according to the event ID and exposes the related information directly regardless of whether the subscription has been relayed by the SMF.

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

##### 5.2.26.2.3 Nupf\_EventExposure\_Subscribe service operation

**Service operation name:** Nupf\_EventExposure\_Subscribe

**Description:** This service operation is used by an NF to subscribe or modify a subscription to UPF event exposure notifications e.g. for the purpose of UPF data collection on a specified PDU Session or for all PDU Sessions of one UE or any UE.

**Input, Required:** NF ID, Target of Event Reporting (but only a specific UE address (i.e. IP address) or "any UE" is allowed), (set of) Event ID(s) defined in clause 5.2.26.2.1, Notification Target Address (+ Notification Correlation ID), Event Reporting Information defined in Table 4.15.1-1 (TS 29.564 [93] defines the possible parameters).

**Input, Optional:** Subscription Correlation ID (in the case of modification of the event subscription), Expiry time, DNN, S-NSSAI, either Application ID(s) or Traffic Filtering Information, Type of Measurement, Granularity of Measurement, Reporting suggestion information, UE private IP address, IP domain, an IP address(es) of the remote end, port number..

**Output, Required:** When the subscription is accepted: Subscription Correlation ID (required for management of this subscription), Expiry time (required if the subscription can be expired based on the operator's policy).

**Output, Optional:** First corresponding event report is included, if available (see clause 4.15.1). Notification Target Address (+ Notification Correlation ID) is used to correlate Notifications sent by UPF with this subscription.

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

#### 5.2.6.36 Nnef\_UEAddress service

##### 5.2.6.36.1 General

See clause 6.2.8.2.4.3 and 6.2.8.2.4.x of TS 23.288 [50].

##### 5.2.6.36.2 Nnef\_UEAddress\_Get operation

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

**Description:** Get the UE IP address (i.e. IPv4 address or IPv6 prefix).

**Inputs, Required:** GPSI, AF Identifier.

**Inputs, Optional:** None.

**Outputs, Required:** Result, UE address (i.e. IPv4 address or IPv6 prefix).

**Outputs, Optional:** None.

##### 5.2.6.36.3 Nnef\_UEAddress\_Susbscribe operation

**Service operation name:** Nnef\_UEAddress\_Subscribe

**Description:** The NF consumer subscribes for the immediate notifications of the NATed UE IP public address and Port number corresponding to Private UE IP address. See 6.2.8.2.4.x of TS 23.288 [50].

**Inputs, Required:** Private UE IP address, AF Identifier, IP address(es) of remote end.

**Inputs, Optional:** Port number(s) of remote end.

**Outputs, Required:** When the subscription is accepted: Subscription Correlation ID.

**Outputs, Optional:** None.

##### 5.2.6.36.4 Nnef\_UEAddress\_UnSusbscribe operation

**Service operation name:** Nnef\_UEAddress\_UnSubscribe

**Description:** Provided by the NEF for NF consumers to explicitly unsubscribe the notification of NATed UE IP public address and Port number.

**Inputs, Required:** Subscription Correlation ID (reference of the subscription)

**Inputs, Optional:** None

**Outputs, Required:** Result Indication.

**Outputs, Optional:** None.

##### 5.2.6.36.5 Nnef\_UEAddress\_Notify service operation

**Service operation name:** Nnef\_ UEAddress\_Notify

**Description:** NEF notifies NF consumer(s) about NATed UE IP public address and Port number, when receives notification from UPF. See 6.2.8.2.4.x of TS 23.288 [50]

**Inputs, Required:** Notification Correlation ID, NATed UE IP public address and Port number.

**Inputs, Optional:** None.

**Outputs, Required:** Result Indication.

**Outputs, Optional:** None.

\* \* \* End of Change \* \* \*