**3GPP TSG-SA2 Meeting #143E *<TDoc#>***

**Feb 24th - March 9th, 2021**

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| *CR-Form-v12.1* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **23.502** | **CR** | **<CR#>** | **rev** | **-** | **Current version:** | **16.7.1** |  |
|  | | | | | | | | |
| *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:*** | Exposure of Time synchronization as a service | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Nokia, Nokia Shangai Bell | | | | | | | | | |
| ***Source to TSG:*** | SA2 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | IIoT | | | | |  | ***Date:*** | | | 2021-01-21 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **B** |  | | | | | ***Release:*** | | | Rel-17 |
|  | *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)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | SA2 FS\_IIoT study has concluded the support for exposure of Time synchronization service and it need to be captured in TS 23.501. The principles to be included are:  1) AF can learn 5GS capabilities to support time synchronization, request time synchronization with specified requirements, and supply information that can be used to optimize and configure time synchronization procedure for connected devices.  2) Time Synchronization service, policy and charging control can be provided for Ethernet PDU sessions and IP PDU sessions. This service is applicable for deployments without TSN integration, for these deployments, the NEF may be used instead of TSN AF.  3) The 5GS must support PTP in addition to gPTP and it may provide the time source.  4) The 5GS may act as a Boundary Clock or as a Transparent Clock. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | Capture the description of time synchronization activation/deactivation support in 23.502 | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | Incomplete specifications | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | | **X** |  | Other core specifications | | | | TS/TR 23.501 CR XXXX | | |
| ***affected:*** | |  | **X** | Test specifications | | | | TS/TR ... CR ... | | |
| ***(show related CRs)*** | |  | **X** | O&M Specifications | | | | TS/TR ... CR ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

# 2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non‑specific.

- For a specific reference, subsequent revisions do not apply.

- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

[1] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".

[2] 3GPP TS 23.501: "System Architecture for the 5G System; Stage 2".

[3] IETF RFC 7296: "Internet Key Exchange Protocol Version 2 (IKEv2)".

[4] Void.

[5] Void.

[6] IETF RFC 4861: "Neighbor Discovery for IP version 6 (IPv6)".

[7] 3GPP TS 23.040: "Technical realization of the Short Message Service (SMS)".

[8] IETF RFC 4862: "IPv6 Stateless Address Autoconfiguration".

[9] 3GPP TS 38.300: "NR and NG-RAN Overall Description; Stage 2".

[10] 3GPP TS 38.413: "NG-RAN; NG Application Protocol (NGAP)".

[11] Void.

[12] 3GPP TS 38.331: "NR; Radio Resource Control (RRC); Protocol Specification".

[13] 3GPP TS 23.401: "General Packet Radio Service (GPRS) enhancements for Evolved Universal Terrestrial Radio Access Network (E-UTRAN) access".

[14] Void.

[15] 3GPP TS 33.501: "Security Architecture and Procedures for 5G System".

[16] 3GPP TS 36.331: "Evolved Universal Terrestrial Radio Access (E-UTRA); Radio Resource Control (RRC); Protocol specification".

[17] 3GPP TS 29.500: "5G System; Technical Realization of Service Based Architecture; Stage 3".

[18] 3GPP TS 29.518: "5G System; Access and Mobility Management Services; Stage 3".

[19] Void.

[20] 3GPP TS 23.503: "Policy and Charging Control Framework for the 5G System ".

[21] IETF RFC 4191: "Default Router Preferences and More-Specific Routes".

[22] 3GPP TS 23.122: "Non-Access-Stratum (NAS) functions related to Mobile Station in idle mode".

[23] 3GPP TS 23.682: "Architecture enhancements to facilitate communications with packet data networks and applications".

[24] 3GPP TS 23.203: "Policy and charging control architecture".

[25] 3GPP TS 24.501: "Non-Access-Stratum (NAS) protocol for 5G System (5GS); Stage 3".

[26] 3GPP TS 23.402: "Architecture enhancements for non-3GPP accesses".

[27] Void.

[28] 3GPP TS 23.167: "IP Multimedia Subsystem (IMS) emergency sessions".

[29] Void.

[30] Void.

[31] Void.

[32] 3GPP TS 29.507: "Access and Mobility Policy Control Service; Stage 3".

[33] 3GPP TS 23.003: "Numbering, Addressing and Identification".

[34] Void.

[35] 3GPP TS 23.251: "Network sharing; Architecture and functional description".

[36] 3GPP TS 29.502: "5G System; Session Management Services; Stage 3".

[37] 3GPP TS 29.510: "5G System; Network function repository services; Stage 3".

[38] 3GPP TS 23.380: "IMS Restoration Procedures".

[39] 3GPP TS 32.421: "Telecommunication management; Subscriber and equipment trace; Trace concepts and requirements".

[40] IETF RFC 4555: "IKEv2 Mobility and Multihoming Protocol (MOBIKE)".

[41] 3GPP TS 24.502: "Access to the 3GPP 5G Core Network (5GCN) via Non-3GPP Access Networks (N3AN); Stage 3".

[42] 3GPP TS 32.290: "Services, operations and procedures of charging using Service Based Interface (SBI)".

[43] 3GPP TS 36.304: "Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) procedures in idle mode".

[44] 3GPP TS 38.304: "NR; User Equipment (UE) procedures in idle mode".

[45] 3GPP TS 32.255: "5G system; 5G data connectivity domain charging; Stage 2".

[46] 3GPP TS 36.300: "Evolved Universal Terrestrial Radio Access (E-UTRA) and Evolved Universal Terrestrial Radio Access Network (E-UTRAN); Overall description; Stage 2".

[47] 3GPP TS 29.513: "5G System; Policy and Charging Control signalling flows and QoS parameter mapping; Stage 3".

[48] IEEE Std 802.11-2016 (Revision of IEEE Std 802.11-2012): "IEEE Standard for Information technology - Telecommunications and information exchange between systems Local and metropolitan area networks - Specific requirements - Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specifications".

[49] IETF RFC 2410: "The NULL Encryption Algorithm and its use with IPsec".

[50] 3GPP TS 23.288: "Architecture enhancements for 5G System (5GS) to support network data analytics services; Stage 2".

[51] 3GPP TS 23.273: "5G System (5GS) Location Services (LCS); Stage 2".

[52] 3GPP TS 29.503: "5G System; Unified Data Management Services; Stage 3".

[53] 3GPP TS 23.316: "Wireless and wireline convergence access support for the 5G System (5GS)".

[54] 3GPP TS 23.222: "Functional architecture and information flows to support Common API Framework for 3GPP Northbound APIs; Stage 2".

[55] 3GPP TS 23.228: "IP Multimedia Subsystem (IMS); Stage 2".

[56] 3GPP TS 36.321: "Evolved Universal Terrestrial Radio Access (E-UTRA); Medium Access Control (MAC) protocol specification".

[57] 3GPP TS 29.512: "5G System; Session Management Policy Control Service; Stage 3".

[58] 3GPP TS 29.525: "5G System; UE Policy Control Service; Stage 3".

[59] IETF RFC 6696: "EAP Extensions for the EAP Re-authentication Protocol (ERP)", July 2012.

[60] IETF RFC 5295: "Specification for the Derivation of Root Keys from an Extended Master Session Key (EMSK)", Aug. 2008.

[61] 3GPP TS 23.272: "Circuit Switched (CS) fallback in Evolved Packet System (EPS); Stage 2".

[62] 3GPP TS 29.501: "5G System; Principles and Guidelines for Services Definition; Stage 3".

[63] 3GPP TS 29.561: "5G System; Interworking between 5G Network and external Data Networks; Stage 3".

[64] 3GPP TS 29.413: "Application of the NG Application Protocol (NGAP) to non-3GPP access".

[65] IEEE Std 802.1Qcc-2018: "Standard for Local and metropolitan area networks - Bridges and Bridged Networks - Amendment: Stream Reservation Protocol (SRP) Enhancements and Performance Improvements".

[66] IEEE Std 802.1Q-2018: "IEEE Standard for Local and Metropolitan Area Networks-Bridges and Bridged Networks".

[67] Void.

[68] 3GPP TS 23.632: "User Data Interworking, Coexistence and Migration".

[69] 3GPP TS 29.244: "Interface between the Control Plane and the User Plane nodes".

[70] 3GPP TS 29.571: "5G System; Common Data Types for Service Based Interfaces; Stage 3".

[71] 3GPP TS 32.256: "Charging Management; 5G connection and mobility domain charging; Stage 2".

[72] 3GPP TS 38.423: "NG-RAN; Xn Application Protocol (XnAP)".

[73] 3GPP TS 23.287: "Architecture enhancements for 5G System (5GS) to support Vehicle-to-Everything (V2X) services".

[74] IEEE Std 1588-2019: "IEEE Standard for a Precision Clock Synchronization Protocol for Networked Measurement and Control".

[75] IEEE Std 802.1AS-2020: "IEEE Standard for Local and metropolitan area networks--Timing and Synchronization for Time-Sensitive Applications".

---Start of the 2nd Change---

#### 4.4.3.1 N4 Association Setup Procedure

The N4 Association Setup procedure is used to setup an N4 association between the SMF and the UPF, to enable the SMF to use the resources of the UPF subsequently to establish N4 Sessions. The SMF and UPF may exchange the supported functionalities on each side during these procedures.

The setup of an N4 association is initiated by the SMF. SMF and UPF may additionally support an N4 association initiated by UPF.

The SMF should only establish an N4 association with a UPF that supports F-TEID allocation at the UPF.

The SMF initiates the N4 Association Setup procedure to request to setup an N4 association towards a UPF prior to establishing a first N4 session on this UPF.

When receiving an N4 Association Setup Request, the UPF shall send an N4 Association Setup Response.

N4 Association Setup procedure can be used to request the UPF to measure and report the clock drift between the external time and 5GS time for one or more external working domains by provisioning External Clock Drift Report as specified in TS 29.244 [69].



Figure 4.4.3.1-1: N4 association setup procedure initiated by SMF

The UPF may initiate the N4 Association Setup procedure to request to setup an N4 association towards a SMF prior to establishing a first N4 session on this UPF.

When receiving an N4 Association Setup Request, the SMF shall send an N4 Association Setup Response.



Figure 4.4.3.1-2: N4 association setup procedure initiated by UPF

#### 4.4.3.2 N4 Association Update Procedure

The N4 Association Update procedure shall be used to modify an existing N4 association between the SMF and the UPF. It may be initiated by the UPF or by the SMF to update the supported features or available resources of the UP function.

N4 Association Update procedure can be used by the SMF to update the provisioning of External Clock Drift Report as specified in TS 29.244 [69].



Figure 4.4.3.2-1: SMF initiated N4 association update procedure



Figure 4.4.3.2-2: UPF initiated N4 association update procedure

#### 4.4.3.3 N4 Association Release Procedure

The N4 Association Release procedure shall be used to terminate the N4 association between the SMF and the UPF due to e.g. OAM reasons. The N4 Association Release Request may be initiated by the SMF or UPF.



Figure 4.4.3.3-1: SMF initiated N4 association release procedure



Figure 4.4.3.3-2: UPF initiated N4 association release procedure

#### 4.4.3.4 N4 Report Procedure

The N4 Report procedure shall be used by the UPF to report information to the SMF which is not related to a specific N4 session, e.g. to report a user plane path failure affecting all the N4 sessions towards a remote GTP-U peer.

N4 Report procedure can be used by the UPF to report the clock drift between the external time and 5GS time for one or more external working domains as specified in TS 29.244 [69].



Figure 4.4.3.4-1: N4 report procedure

The UPF detects that an event has to be reported and starts the procedure by sending an N4 Report message (UPF ID, list of [event, status]) to the SMF. The SMF responds with an N4 report ACK message (SMF ID). The event parameter contains the name of the event and UPF ID. The status parameter contains the actual information the control plane function is interested in. If the UPF detects clock drifting between 5G time and one or more external working domains, the UPF reports the corresponding time domain number and the time offset and cumulative rateRatio according to the provisioning from the SMF as defined in clause 5.27.2 of TS 23.501 [2].

---Start of the 3rd Change---

### 4.15.6 External Parameter Provisioning

#### 4.15.6.1 General

Provisioning capability allows an external party to provision the information, such as expected UE behaviour and service specific parameters, time synchronization service information, or the 5G VN group information to 5G network functions. In the case of provisioning the expected UE behavioural information, the expected UE behavioural information consists of information on expected UE movement and communication characteristics. In the case of provisioning the 5G VN group information the provisioning information consists of information on 5G VN group. In the case of provisioning the time synchronization service information the provisioning information consists of information on the time synchronization service requirements and operation within the 5GS. The service specific information consists of information to support the specific service in 5G system. Provisioned data can be used by the other NFs.

#### 4.15.6.2 NEF service operations information flow



Figure 4.15.6.2-1: Nnef\_ParameterProvision\_Create / Nnef\_ParameterProvision\_Update / Nnef\_ParameterProvision\_Delete request/response operations

0. NF subscribes to UDM notifications of UE and/or Group Subscription data updates.

NOTE 1: The NF can subscribe to Group Subscription data from UDM in this step and be notified of Group Subscription data updates in step 7 using the Shared Data feature defined in TS 29.503 [52].

0b. [Conditional, on using NWDAF-assisted values] The AF may subscribe to NWDAF via NEF in order to learn the UE mobility analytics and/or UE Communication analytics for a UE or group of UEs by applying the procedure specified in TS 23.288 [50] clause 6.1.1.2. The Analytics Id is set to any of the values specified in TS 23.288 [50] clause 6.7.1.

0c. [Conditional, on using NWDAF-assisted values] AF validates the received data and derives any of the Expected UE behaviour parameters defined in clause 4.15.6.3 for a UE or group of UEs.

1. The AF provides one or more parameter(s) to be created or updated in a Nnef\_ParameterProvision\_Create or Nnef\_ParameterProvision\_Update or Nnef\_ParameterProvision\_Delete Request to the NEF.

The GPSI identifies the UE and the Transaction Reference ID identifies the transaction request between NEF and AF. For the case of Nnef\_ParameterProvision\_Create, The NEF assigns a Transaction Reference ID to the Nnef\_ParameterProvision\_Create request.

NEF checks whether the requestor is allowed to perform the requested service operation by checking requestor's identifier (i.e. AF ID).

For a Create request associated with a 5G VN group, the External Group ID identifies the 5G VN Group.

The payload of the Nnef\_ParameterProvision\_Update Request includes one or more of the following parameters:

- Expected UE Behaviour parameters (see clause 4.15.6.3), or

- Network Configuration parameters (see clause 4.15.6.3a), or

- External Group Id and 5G VN group data (i.e. 5G-VN configuration parameters) (see clause 4.15.6.3b), or

- 5G VN group membership management parameters (see clause 4.15.6.3c).

- Location Privacy Indication parameters of the "LCS privacy" Data Subset of the Subscription Data (see clause 5.2.3.3.1 and TS 23.273 [51] clause 7.1)

- Time synchronization service parameters (see clause 4.15.6.9)

The AF may request to delete 5G VN configuration by sending Nnef\_ParameterProvision\_Delete to the NEF.

2. If the AF is authorised by the NEF to provision the parameters, the NEF requests to create, update and store, or delete the provisioned parameters as part of the subscriber data via Nudm\_ParameterProvision\_Create, Nudm\_ParameterProvision\_Update or Nudm\_ParameterProvision\_Delete Request message, the message includes the provisioned data and NEF reference ID.

If the AF is not authorised to provision the parameters, then the NEF continues in step 6 indicating the reason to failure in Nnef\_ParameterProvision\_Create/Update/Delete Response message. Step 7 does not apply in this case.

NOTE 2: For non-roaming case and no authorisation or validation by the UDM required and if the request is not associated with a 5G VN group, the NEF can directly forward the external parameter to the UDR via Nudr\_DM\_Update Request message. And in this case, the UDR responds to NEF via Nudr\_DM\_Update Response message.

3. UDM may read from UDR, by means of Nudr\_DM\_Query, corresponding subscription information in order to validate required data updates and authorize these changes for this subscriber or Group for the corresponding AF.

4. If the AF is authorised by the UDM to provision the parameters for this subscriber, the UDM resolves the GPSI to SUPI, and requests to create, update or delete the provisioned parameters as part of the subscriber data via Nudr\_DM\_Create/Update/Delete Request message, the message includes the provisioned data.

If a new 5G VN group is created, the UDM shall assign a unique Internal Group ID for the 5G VN group and include the newly assigned Internal Group ID in the Nudr\_DM\_Create Request message. If the list of 5G VN group members is changed or if 5G VN group data has changed, the UDM updates the UE and/or Group subscription data according to the AF/NEF request.

UDR stores the provisioned data as part of the UE and/or Group subscription data and responds with Nudr\_DM\_Create/Update/Delete Response message.

When the 5G VN group data (as described in clause 4.15.6.3b) is updated, the UDR notifies to the subscribed PCF by sending Nudr\_DM\_Notify as defined in clause 4.16.12.2.

If the AF is not authorised to provision the parameters, then the UDM continues in step 5 indicating the reason to failure in Nudm\_ParameterProvision\_Update Response message and step 7 is not executed.

The UDM classifies the received parameters (i.e. Expected UE Behaviour parameters or the Network Configuration parameters or the 5G VN configuration parameters or Location Privacy Indication parameters), into AMF-Associated and SMF-Associated parameters. The UDM may use the AF ID received from the NEF in step 2 to relate the received parameter with a particular subscribed DNN and/or S-NSSAI. The UDM stores the SMF-Associated parameters under corresponding Session Management Subscription data type.

Each parameter or parameter set may be associated with a validity time. The validity time is stored at the UDM/UDR and in each of the NFs, to which parameters are provisioned (e.g. in AMF or SMF). Upon expiration of the validity time, each node deletes the parameters autonomously without explicit signalling.

5. UDM responds the request with Nudm\_ParameterProvision\_Create/Update/Delete Response. If the procedure failed, the cause value indicates the reason.

6. NEF responds the request with Nnef\_ParameterProvision\_Create/Update/Delete Response. If the procedure failed, the cause value indicates the reason.

7. [Conditional this step occurs only after successful step 4] UDM notifies the subscribed Network Function (e.g., AMF) of the updated UE and/or Group subscription data via Nudm\_SDM\_Notification Notify message.

a) If the NF is AMF, the UDM performs Nudm\_SDM\_Notification (SUPI or Internal Group Identifier, AMF-Associated parameters, etc.) service operation. The AMF identifies whether there are overlapping parameter set(s) and merges the parameter set(s) in the Expected UE Behaviour, if necessary. The AMF uses the received AMF-Associated parameters to derive the appropriate UE configuration of the NAS parameters and to derive Core Network assisted RAN parameters. The AMF may determine a Registration area based on parameters Stationary indication or Expected UE Moving Trajectory.

b) If the NF is SMF, the UDM performs Nudm\_SDM\_Notification (SUPI or Internal Group Identifier, SMF-Associated parameter set, DNN/S-NSSAI, etc.) service operation.

The SMF stores the received SMF-Associated parameters and associates them with a PDU Session based on the DNN and S-NSSAI included in the message from UDM. The SMF identifies whether there are overlapping parameter set(s) in the Expected UE behaviour and merges the parameter set(s), if necessary. The SMF may use the SMF-Associated parameters as follows:

- SMF configures the UPF accordingly. The SMF can use the Scheduled Communication Type parameter or Suggested Number of Downlink Packets parameter to configure the UPF with how many downlink packets to buffer. The SMF may use the parameter Communication duration time to determine to deactivate UP connection and to perform CN-initiated selective deactivation of UP connection of an existing PDU Session.

- The SMF may derive SMF derived CN assisted RAN information for the PDU Session. The SMF provides the SMF derived CN assisted RAN information to the AMF as described in PDU Session establishment procedure or PDU Session modification procedure.

NOTE 3: The NEF (in NOTE 1) or the UDM (in step 3) can also update the corresponding UDR data via Nudr\_DM\_Create/Delete as appropriate.

---Start of the 4th Change---

#### 4.15.6.9 Time Synchronization parameters provisioning

As described in TS 23.501 [2] clause 5.27.1.3, an AF may learn 5GS capabilities to support time synchronization and request to influence time synchronization distribution configuration.

Time synchronization parameters are described in Table 4.15.6.9.

Table 4.15.6.9-1: Description of Time Synchronization service parameters

|  |  |
| --- | --- |
| Time Synchronization parameter | Description |
| Time synchronization distribution method | Identifies the time synchronization distribution option selected for the service and the operation the 5GS performs for time distribution: IEEE Std 1588 [74] operation (i.e. as a Boundary Clock, peer-to-peer Transparent Clock, or end-to-end Transparent Clock) and transport protocol (Ethernet, UDP over IPv4, or UDP over IPv6), IEEE Std 802.1AS [75] operation, or 5G internal system clock. |
| Synchronization accuracy | Indicates the accuracy requirement for the time distribution service.  [optional] |
| Time Domain | As defined in IEEE Std 1588 [74].  [optional] |
| Information related with DS-TT capabilities | Indicates if the targeted DS-TT(s) are GM capable and GM attributes as defined in IEEE Std 1588 [74] or IEEE Std 802.1AS [75].  [optional] |
| Information related with IEEE Std 1588 [74] or IEEE Std 802.1AS [75] configuration | This information may be used to configure (g)PTP operation at the DS-TT(s) and NW-TT(s) (as defined in TS 23.501 [2] clause 5.27.1.3). It may indicate:   * Required PTP device type * (g)PTP message rate (initial Sync interval, initial Announce interval) * (g)PTP timeout parameters (Sync message timeout, Announce message timeout) * GM priority * Clock identity * Clock quality   [optional] |

The AF may use Nnef\_ChargeableParty\_Get operation to learn 5GS capabilities to support time synchronization service.

---Start of the 5th Change---

#### 5.2.6.4 Nnef\_ParameterProvision service

##### 5.2.6.4.1 General

This service is for allowing external party to provision of information which can be used for the UE in 5GS.

##### 5.2.6.4.2 Nnef\_ParameterProvision\_Update service operation

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

**Description:** The consumer updates the UE related information (e.g., Expected UE Behaviour, time synchronization service, Network Configuration parameters, Location Privacy Indication parameters) or 5G VN Group related information (e.g. 5G VN group data, 5G VN membership management).

**Inputs, Required:** AF ID, Transaction Reference ID.

**Inputs, Optional:** GPSI, External Group ID at least one of the Expected UE Behaviour parameters or at least one of the Network Configuration parameters or or time synchronization information or 5G VN related information, Validity Time or Location Privacy Indication parameters.

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

**Outputs, Optional:** Transaction specific parameters, if available.

##### 5.2.6.4.3 Nnef\_ParameterProvision\_Create service operation

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

**Description:** The consumer creates a 5G VN group.

**Inputs, Required:** AF ID, Transaction Reference ID.

**Inputs, Optional:** GPSI, External Group ID for 5G VN group creation, External Group ID, 5G VN group related information (e.g., 5G VN group data, 5G VN membership management).

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

**Outputs, Optional:** Transaction specific parameters, if available.

##### 5.2.6.4.4 Nnef\_ParameterProvision\_Delete service operation

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

**Description:** The consumer deletes a 5G VN group.

**Inputs, Required:** AF ID, Transaction Reference ID.

**Inputs, Optional:** External Group ID.

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

**Outputs, Optional:** None.

##### 5.2.6.4.5 Nnef\_ParameterProvision\_Get service operation

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

**Description:** The consumer gets the UE related information (e.g. Expected UE Behaviour, Network Configuration parameters, time synchronization service).

**Inputs, Required:** GPSI, AF ID, requested information (e.g., Expected UE Behaviour, Network Configuration parameters, time synchronization service).

**Inputs, Optional:** None.

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

**Outputs, Optional:** None.

---End of Changes---