**3GPP TSG-WG SA2 Meeting #143E e-meeting  *S2-210xxxx***

**Elbonia, Feb 24 – March 9, 2021**

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| *CR-Form-v12.1* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
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|  | **23.502** | **CR** | **ADD** | **rev** | **-** | **Current version:** | **16.7.0** |  |
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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 | **x** | Radio Access Network |  | Core Network | **X** |

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| ***Title:*** | Introduction of Busy Indication response to paging | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Sony, Nokia, Vivo, Qualcomm, Xiaomi, Samsung, Huawei, China Telecom, Charter, MediaTek, Oppo, Intel, Convida Wireless, Apple | | | | | | | | | |
| ***Source to TSG:*** | SA2 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | MUSIM | | | | |  | ***Date:*** | | | 2021-02-24 |
|  |  | | | |  | |  | | |  |
| ***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:*** | | Intoduction of the new feature where a UE can respond to paging with a Busy Indication. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | Add the option to respond with a Busy Indication when paged. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | The new agreed feature from the FS\_MuSIM is not introdused. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 4.2.3.2, 4.2.3.3, 5.2.2.2.7, 5.2.2.2.7A | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **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:*** | |  | | | | | | | | |

\*\*\*\*\* BEGIN 1st CHANGE \*\*\*\*\*

#### 4.2.3.2 UE Triggered Service Request

The UE in CM‑IDLE state initiates the Service Request procedure in order to send uplink signalling messages, user data, to request emergency services fallback, or as a response to a network paging request. The UE shall not initiate UE Triggered Service Request from CM-IDLE if there is a Service Gap timer running. After receiving the Service Request message, the AMF may perform authentication. After the establishment of the signalling connection to an AMF, the UE or network may send signalling messages, e.g. PDU Session establishment from UE to the SMF, via the AMF.

The Service Request procedure is used by a UE in CM-CONNECTED to request activation of a User Plane connection for PDU Sessions and to respond to a NAS Notification message from the AMF. When a User Plane connection for a PDU Session is activated, the AS layer in the UE indicates it to the NAS layer.

For any Service Request, the AMF responds with a Service Accept message to synchronize PDU Session status between UE and network, if necessary. The AMF responds with a Service Reject message to UE, if the Service Request cannot be accepted by network. The AMF may steer the UE from 5GC by rejecting the Service Request. The AMF should take into account the Preferred and Supported Network Behaviour (see TS 23.501 [2], clause 5.31.2) and availability of EPC to the UE before steering the UE from 5GC. The Service Reject message may include an indication or cause code requesting the UE to perform Registration procedure.

For this procedure, the impacted SMF and UPF, if any, are all under control of the PLMN serving the UE, e.g. in Home Routed roaming case the SMF and UPF in HPLMN are not involved if V-SMF relocation is not triggered.

For Service Request due to user data, network may take further actions if User Plane connection activation is not successful.

The procedure in this clause 4.2.3.2 is applicable to the scenarios with or without intermediate UPF, and with or without intermediate UPF reselection.

If the UE initiates Service Request procedures via non-3GPP Access, functions defined in the clause 4.12.4.1 are applied.

The User Plane of all PDU Sessions with redundant I-UPFs or with redundant N3/N9 tunnels for URLLC shall be activated during the Service Request procedure if the UE in CM-IDLE state initiates the Service Request procedure from 3GPP access. If the redundant I-UPFs are to be added/replaced/removed, the N4 Session procedure to manage the I-UPF is done for each I-UPF in steps 6c, 6d,7a, 7b, 8a, 8b, 9, 10, 17a,17b, 20a, 20b, 21a,21b, 22a and 22b of the figure 4.2.3.2-1. If the redundant N3/N9 tunnels are used for URLLC and the I-UPF is to be added/replaced/removed, the N4 Session procedure to update the tunnel is done for each N3/N9 tunnel in steps 6c, 6d,7a, 7b, 8a, 8b, 9, 10, 17a, 17b. 20a, 20b, 21a, and 21b of the figure 4.2.3.2-1.



Figure 4.2.3.2-1: UE Triggered Service Request procedure

1. UE to (R)AN: AN message (AN parameters, Service Request (List Of PDU Sessions To Be Activated, List Of Allowed PDU Sessions, security parameters, PDU Session status, 5G-S-TMSI, [NAS message container], Exempt Indication)).

The NAS message container shall be included if the UE is sending a Service Request message as an Initial NAS message and the UE needs to send non-cleartext IEs, see clause 4.4.6 in TS 24.501 [25].

The List Of PDU Sessions To Be Activated is provided by UE when the UE wants to re-activate the PDU Session(s). The List Of Allowed PDU Sessions is provided by the UE when the Service Request is a response of a Paging or a NAS Notification for a PDU Session associated with non-3GPP access, and identifies the PDU Sessions that can be transferred to 3GPP access.

In the case of NG-RAN:

- The AN parameters include 5G-S-TMSI, Selected PLMN ID (or PLMN ID and NID, see TS 23.501 [2], clause 5.30), Establishment cause and may also include NSSAI information. The Establishment cause provides the reason for requesting the establishment of an RRC connection. Whether and how the UE includes the NSSAI information as part of the AN parameters is dependent on the value of the Access Stratum Connection Establishment NSSAI Inclusion Mode parameter, as specified in clause 5.15.9 of TS 23.501 [2].

- The UE sends Service Request message towards the AMF encapsulated in an RRC message to the NG-RAN. The RRC message(s) that can be used to carry the 5G-S-TMSI and this NAS message are described in TS 38.331 [12] and TS 36.331 [16].

If the Service Request is triggered by the UE for user data, the UE identifies, using the List Of PDU Sessions To Be Activated, the PDU Session(s) for which the UP connections are to be activated in Service Request message. When the UE includes the List Of PDU Sessions To Be Activated, the UE shall indicate PDU Sessions only associated with the access the Service Request is related to. If the Service Request is triggered by the UE for signalling only, the UE doesn't identify any List Of PDU Sessions To Be Activated. If this procedure is triggered for paging response, and the UE has at the same time some user data to be transferred, the UE identifies the PDU Session(s) whose UP connections are to be activated in Service Request message, by the List Of PDU Sessions To Be Activated. Otherwise the UE does not identify any PDU Session(s) in the Service Request message for paging response. As defined in TS 24.501 [25] the UE shall include always-on PDU Sessions which are accepted by the network in the List Of PDU Sessions To Be Activated even if there are no pending uplink data for those PDU Sessions or when the Service Request is triggered for signalling only or when the Service Request is triggered for paging response.

If the Service Request over 3GPP access is triggered in response to the paging or NAS Notification indicating non-3GPP access, the Service Request message shall identify the list of PDU Sessions associated with the non-3GPP access that can be re-activated over 3GPP access in the List Of Allowed PDU Sessions, as described in clause 4.2.3.3 (step 6) of this specification and in clause 5.6.8 of TS 23.501 [2].

If the Service Request over 3GPP access is triggered in response to the paging and if the UE decides not to accept the paging the UE includes a Busy Indication in the Service Request message.

If the Service Request is triggered to report PS Data Off status change and the UE is in Non-Allowed Area, the UE shall send Service Request message with an indication that the message is exempted from restriction (e.g. Non-Allowed Area). In this case, if the UE is in Non-Allowed Area, the UE shall not include the List Of PDU Sessions To Be Activated and as a result the always-on PDU Session is not re-activated during the Service Request procedure.

The PDU Session status indicates the PDU Sessions available in the UE.

The UE shall not trigger a Service Request procedure for a PDU Session corresponding to a LADN when the UE is outside the area of availability of the LADN.

NOTE 1: A PDU Session corresponding to a LADN is not included in the List Of PDU Sessions To Be Activated when the UE is outside the area of availability of the LADN.

For UE in CM-CONNECTED state, only the List Of PDU Sessions To Be Activated and List Of Allowed PDU Sessions need to be included in the Service Request.

2. (R)AN to AMF: N2 Message (N2 parameters, Service Request).

Details of this step are described in TS 38.413 [10]. If the AMF can't handle the Service Request it will reject it.

When NG-RAN is used, the N2 parameters include the 5G-S-TMSI, Selected PLMN ID (or PLMN ID and NID, see TS 23.501 [2], clause 5.30), Location information and Establishment cause, UE Context Request.

If the UE is in CM-IDLE state, the NG-RAN obtains the 5G-S-TMSI in RRC procedure. NG-RAN selects the AMF according to 5G-S-TMSI. The Location Information relates to the cell in which the UE is camping.

Based on the PDU Session status, the AMF may initiate PDU Session Release procedure in the network for the PDU Sessions whose PDU Session ID(s) were indicated by the UE as not available.

When the Establishment cause is associated with priority services (e.g. MPS, MCS), the AMF includes a Message Priority header to indicate priority information. Other NFs relay the priority information by including the Message Priority header in service-based interfaces, as specified in TS 29.500 [17].

The AMF enforces the Mobility Restrictions as specified in TS 23.501 [2], clause 5.3.4.1.1.

If there is a Service Gap timer running in AMF for the UE and the AMF is not waiting for a MT paging response from the UE and the Service Request is not for regulatory prioritized services like Emergency services or not for exception reporting, the AMF rejects the Service Request with an appropriate cause. In addition, AMF may also provide a UE with a Mobility Management Back-off timer set to the remaining value of the Service Gap timer.

If the AMF supports RACS, and the AMF detects that the selected PLMN is different from the currently registered PLMN for the UE, the AMF determines the UE Radio Capability ID of the newly selected PLMN to the gNB as described in TS 23.501 [2] clause 5.4.4.1a.

3a) AMF to (R)AN: N2 Request (security context, Mobility Restriction List, list of recommended cells / TAs / NG-RAN node identifiers).

If the 5G-AN had requested for UE Context or there is a requirement for AMF to provide this e.g. the AMF needs to initiate fallback procedure as in clause 4.13.4.2 for Emergency services, AMF initiates NGAP procedure as specified in TS 38.413 [10]. For UE in CM-IDLE state, 5G-AN stores the Security Context in the UE AN context. Mobility Restriction List is described in TS 23.501 [2] clause 5.3.4.1 "Mobility Restrictions".

The 5G-AN uses the Security Context to protect the messages exchanged with the UE as described in TS 33.501 [15].

If the NG-RAN node had provided the list of recommended cells / TAs / NG-RAN node identifiers during the AN Release procedure (see clause 4.2.6), the AMF shall include it in the N2 Request. The RAN may use this information to allocate the RAN Notification Area when the RAN decides to enable RRC Inactive state for the UE.

3. If the Service Request was not sent integrity protected or integrity protection verification failed, the AMF shall reject the Service Request as stated in TS 24.501 [25].

If the UE in CM-IDLE state triggered the Service Request to establish a signalling connection only, after successful establishment of the signalling connection the UE and the network can exchange NAS signalling and steps 4 to 11 and 15 to 22 are skipped.

If the UE in Non-Allowed Area triggered the Service Request with an indication that the message is exempted from restriction (e.g. Non-Allowed Area), the AMF should accept the Service Request. In this case, if the UE is in Non-Allowed Area, the AMF rejects user plane setup request from the SMF except for emergency services.

If the procedure was triggered in response to paging or NAS notification indicating non-3GPP access, and the AMF received N1 SM Container only from the SMF in step 3a of clause 4.2.3.3, the AMF sends the NAS signalling including the N1 SM Container to the UE in step 7 of clause 4.2.3.3 without updating the access associated to the PDU Session.

If the procedure was triggered in response to paging and the Service Request message includes a Busy Indication, the AMF immediately sends the NAS signalling including the acknowledgment of the Busy indication and initiates the UCU procedure as described in step 7 of clause 4.2.3.3. The remaining steps of the Service Request procedure is not performed.

4. [Conditional] AMF to SMF: Nsmf\_PDUSession\_UpdateSMContext Request (PDU Session ID(s), Operation Type, UE location information, Access Type, RAT Type, UE presence in LADN service area, Indication of Access Type can be changed, [MO Exception Data Counter]).

The Nsmf\_PDUSession\_UpdateSMContext Request is invoked:

- If the UE identifies List Of PDU Sessions To Be Activated in the Service Request message;

- This procedure is triggered by the SMF but the PDU Session(s) identified by the UE correlates to other PDU Session ID(s) than the one triggering the procedure; or

- If this procedure is triggered by the SMF in response to paging or NAS notification indicating 3GPP access or if this step onwards is invoked following step 4a of clause 4.2.3.3, and the current UE location is outside the "Area of validity for the N2 SM information" provided by the SMF in step 3a of clause 4.2.3.3 or the "Area of validity for the N2 SM information" was not provided by the SMF in step 3a of clause 4.2.3.3, the AMF shall not send the N2 information provided by the SMF in step 3a of clause 4.2.3.3. Otherwise, if the current UE location is in the "Area of validity for the N2 SM information", steps 4 to 11 are skipped; or

- If this procedure is triggered by the SMF in response to paging or NAS notification indicating non-3GPP access, and the AMF received N2 SM Information only, or both N1 SM Container and N2 SM Information in step 3a of clause 4.2.3.3.

If the DNN corresponds to an LADN then the "UE presence in LADN service area" indicates if the UE is IN or OUT of the LADN service area. If the AMF does not provide the "UE presence in LADN service area" indication and the SMF determines that the DNN corresponds to a LADN, then the SMF considers that the UE is OUT of the LADN service area.

The AMF determines the PDU Session(s) for which the UP connection(s) shall be activated and sends an Nsmf\_PDUSession\_UpdateSMContext Request to SMF(s) associated with the PDU Session(s) with Operation Type set to "UP activate" to indicate establishment of User Plane resources for the PDU Session(s). The AMF determines Access Type and RAT Type, see clause 4.2.2.2.1. If the RAT type is NB-IoT, the AMF shall ensure that the number of PDU session(s) for which UP connection(s) are active does not exceed this UE's maximum number of supported user plane resources (0, 1 or 2) based on whether the UE supports UP data transfer and the UE 5GMM Core Network Capability as described in clause 5.31.19 of TS 23.501 [2].

If the procedure was triggered in response to paging or NAS Notification indicating non-3GPP access, the AMF received N2 SM Information in step 3a of clause 4.2.3.3 and the PDU Session for which the UE was paged or notified is not in the List Of Allowed PDU Sessions provided by the UE, the AMF notifies the SMF that the UE is not reachable. For other PDU Sessions in the List Of Allowed PDU Sessions the Service Request Procedure succeeds without re-activating the User Plane of any PDU Sessions, unless they have also been included by the UE in the List Of PDU Sessions To Be Activated.

If the procedure was triggered in response to paging or NAS notification indicating non-3GPP access, and the PDU Session for which the UE was paged or notified is in the List Of Allowed PDU Sessions provided by the UE, and the AMF received N2 SM Information only or N1 SM Container and N2 SM Information from the SMF in step 3a of clause 4.2.3.3, the AMF notifies the SMF that the access type of the PDU session can be changed. The AMF discards any already received N1 SM Container and N2 SM Information. In Home Routed roaming case, the V-SMF triggers Nsmf\_PDUSession\_Update service operation towards the H-SMF to notify the access type of the PDU Session can be changed and the procedure continues as specified in clause 4.3.3.3 from step 1a to step 10.

If the UE is accessing via the NB-IoT RAT, the AMF may inform all (H-)SMFs whether the RRC establishment cause is set to "MO exception data", as described in TS 23.501 [2], clause 5.31.14.3. The AMF may immediately send the MO Exception Data Counter to the (H-)SMF.

The AMF may receive a Service Request to establish another NAS signalling connection via a new NG-RAN while it has maintained an old NAS signalling connection for UE still via an old NG-RAN. The new NG-RAN and the old NG-RAN can be the same NG-RAN node. In this case, AMF shall trigger the AN release procedure toward the old NG-RAN to release the old NAS signalling connection as defined in clause 4.2.6 and:

- For the PDU Sessions indicated by the UE in the List Of PDU Sessions To Be Activated, the AMF requests the SMF to activate the PDU Session(s) immediately by performing this step 4; and

NOTE 2: This activates the UP of PDU Session(s) using resources of the new NG-RAN.

- For the PDU Sessions indicated by the old NG-RAN in the "List of PDU Session ID(s) with active N3 user plane" but not in the List Of PDU Sessions To Be Activated sent by the UE, the AMF requests the SMF to deactivate the PDU Session(s).

NOTE 3: This deactivates the UP of PDU Session(s) that are no more needed by the UE.

5a. [Conditional] SMF to PCF: If the AMF notified the SMF that the access type of the PDU session can be changed in step 4, and if PCC is deployed, the SMF perform an SMF initiated SM Policy Association Modification procedure as defined in clause 4.16.5.1 if Policy Control Request Trigger condition(s) have been met (i.e. change of Access Type). The PCF may provide updated PCC Rule(s).

5b. If the PDU Session ID corresponds to a LADN and the SMF determines that the UE is outside the area of availability of the LADN based on the "UE presence in LADN service area" from the AMF, the SMF decides to (based on local policies) either:

- keep the PDU Session, but reject the activation of User Plane connection for the PDU Session and inform the AMF about it. If the procedure has been triggered by a Network Triggered Service Request as described in clause 4.3.2.3, the SMF may notify the UPF that originated the Data Notification to discard downlink data for the PDU Sessions and/or to not provide further Data Notification messages; or

- to release the PDU Session: the SMF releases the PDU Session and informs the AMF that the PDU Session is released.

In any case of the two cases above the SMF answers to the AMF (step10) with an appropriate reject cause and the User Plane Activation of PDU Session is stopped.

Otherwise, based on the location info received from the AMF, the SMF checks the UPF Selection Criteria according to clause 6.3.3 of TS 23.501 [2], and determines to perform one of the following:

- accepts the activation of UP connection and continue using the current UPF(s);

- accepts the activation of UP connection and selects a new intermediate UPF (or add/remove an intermediate UPF), if the UE has moved out of the service area of the UPF that was previously connecting to the AN, while maintaining the UPF(s) acting as PDU Session Anchor. The steps to perform I-UPF addition/change/removal are described as conditional steps in the following of the current procedure; or

NOTE 4: If the old and/or new I-UPF implements an UL CL or BP functionality and a PDU Session Anchor for connectivity to the local access to the Data Network as described in TS 23.501 [2] clause 5.6.4.2, the signalling described in the current clause is intended as the signalling to add, remove or change the PDU Session Anchor, and must be complemented by the signalling to add, release or change the UL CL or BP as described respectively in clauses 4.3.5.4, 4.3.5.5 and 4.3.5.7.

- rejects the activation of UP connection of a PDU Session of SSC mode 2, and trigger re-establishment of the PDU Session after Service Request procedure to perform the allocation of a new UPF to act as PDU Session Anchor, e.g. the UE has moved out of the service area of the anchor UPF which is connecting to NG-RAN.

In the case that the SMF fails to find suitable I-UPF, the SMF decides to (based on local policies) either:

- trigger re-establishment of PDU Session. After Service Request procedure, SMF sends N1 SM message to the UE via the AMF by invoking Namf\_Communication\_N1N2MessageTransfer containing the cause indicating PDU Session re-establishment is required for the UE; or

- keep the PDU Session, but reject the activation request of User Plane connection for the PDU Session and inform the AMF about it; or

- release the PDU Session after Service Request procedure.

If the SMF has determined that the UE is performing Inter-RAT mobility to or from the NB-IoT RAT then the SMF uses the "PDU Session continuity at inter RAT mobility" to determine how to handle the PDU Session.

6a. [Conditional] SMF to UPF (PSA): N4 Session Modification Request.

Depending on the network deployment, the CN Tunnel Info of UPF (PSA) allocated for N3 or N9 interface may be changed during the Service Request procedure, e.g. UPF connected to different IP domains. If different CN Tunnel Info need be used, the SMF sends N4 Session Modification Request message to UPF (PSA) and requests CN Tunnel Info providing the target Network Instance.

6b. [Conditional] UPF (PSA) to SMF: N4 Session Modification Response.

The UPF (PSA) sends an N4 Session Establishment Response message to the SMF. The UPF provides CN Tunnel Info to the SMF. The UPF (PSA) associate the CN Tunnel Info with UL Packet detection rules provided by the SMF.

If the redundant I-UPFs are used for URLLC, each I-UPF provides UL CN Tunnel Info for N3 interface to the SMF in the N4 Session Establishment Response message.

If the redundant N3 tunnels are used for URLLC, the UPF (PSA) provides redundant UL CN Tunnel Info for N3 interface to the SMF in N4 Session Establishment Response message.

6c. [Conditional] SMF to new UPF (intermediate): N4 Session Establishment Request.

If the SMF selects a new UPF to act as intermediate UPF for the PDU Session, or if the SMF selects to insert an intermediate UPF for a PDU Session which did not have an intermediate UPF, an N4 Session Establishment Request message is sent to the new UPF, providing Packet detection, Data forwarding, enforcement and reporting rules to be installed on the intermediate UPF. The CN Tunnel Info (on N9) of PSA, i.e. which is used to establish the N9 tunnel, for this PDU Session is also provided to the intermediate UPF.

If a new UPF is selected by the SMF to replace the old (intermediate) UPF, the SMF may also include a request for the new UPF to allocate a second tunnel endpoint for buffered DL data from the old I-UPF and to indicate via usage reporting end marker reception on this second tunnel. In this case, the UPF is instructed by the SMF to buffer the DL data it may receive at the same time from the UPF (PSA).

6d. New UPF (intermediate) to SMF: N4 Session Establishment Response.

The new intermediate UPF sends an N4 Session Establishment Response message to the SMF. The UPF provides DL CN Tunnel Info as requested by SMF in step 6c. The SMF starts a timer, to be used in step 22a to release the resource in old intermediate UPF if there is one.

7a. [Conditional] SMF to UPF (PSA): N4 Session Modification Request.

If the SMF selects a new UPF to act as intermediate UPF for the PDU Session, the SMF sends N4 Session Modification Request message to PDU Session Anchor UPF, providing DL Tunnel Info from new intermediate UPF. If the new intermediate UPF was added for the PDU Session, the UPF (PSA) begins to send the DL data to the new I-UPF as indicated in the DL CN Tunnel Info. The UPF (PSA) sends one or more "end marker" packets for each N9 tunnel to the old I-UPF immediately after switching the path to new I-UPF.

If the Service Request is triggered by the network, and the SMF removes the old I-UPF but does not replace it with a new I-UPF, the SMF may also include a request for the UPF to allocate a second tunnel endpoint for buffered DL data from the old I-UPF and to indicate end marker reception on this second tunnel via usage reporting. In this case, the UPF (PSA) begins to buffer the DL data it may receive at the same time from the N6 interface. The UPF (PSA) sends one or more "end marker" packets for each N9 tunnel to the old I-UPF immediately after switching the path to (R)AN.

7b. The UPF (PSA) sends N4 Session Modification Response message to SMF.

If requested by SMF, the UPF (PSA) sends DL CN tunnel info for the old (intermediate) UPF to the SMF. The SMF starts a timer, to be used in step 22a to release the resource in old intermediate UPF if there is one.

If the UPF that connects to RAN is the UPF (PSA), and if the SMF finds that the PDU Session is activated when receiving the Nsmf\_PDUSession\_UpdateSMContext Request in step 4 with Operation Type set to "UP activate" to indicate establishment of User Plane resources for the PDU Session(s), it deletes the AN Tunnel Info and initiates an N4 Session Modification procedure to remove Tunnel Info of AN in the UPF.

8a. [Conditional] SMF to old UPF (intermediate): N4 Session Modification Request (New UPF address, New UPF DL Tunnel ID)

If the service request is triggered by the network, and the SMF removes the old (intermediate) UPF, the SMF sends the N4 Session Modification Request message to the old (intermediate) UPF, providing the DL Tunnel Info for the buffered DL data. If the SMF allocated new I-UPF, the DL Tunnel Info is from the new (intermediate) UPF acting as N3 terminating point. If the SMF did not allocate a new I-UPF, the DL Tunnel Info is from the new UPF (PSA) acting as N3 terminating point. The SMF starts a timer to monitor the forwarding tunnel as step 6d or 7b.

If the old I-UPF receives end marker packets and there is no associated tunnel to forward these packets, the old I-UPF discards the received end marker packets and does not send any Data Notification to SMF.

If the SMF find the PDU Session is activated when receiving the Nsmf\_PDUSession\_UpdateSMContext Request in step 4 with Operation Type set to "UP activate" to indicate establishment of User Plane resources for the PDU Session(s), it deletes the AN Tunnel Info and initiates an N4 Session Modification procedure to remove Tunnel Info of AN in the UPF.

8b. old UPF (intermediate) to SMF: N4 Session Modification Response

The old (intermediate) UPF sends N4 Session Modification Response message to SMF.

9. [Conditional] old UPF (intermediate) to new UPF (intermediate): buffered downlink data forwarding

If the I-UPF is changed and forwarding tunnel was established to the new I-UPF, the old (intermediate) UPF forwards its buffered data to the new (intermediate) UPF acting as N3 terminating point. If indicated by SMF in step 6c, the new I-UPF reports to SMF when end marker packet is received. Then the SMF initiates N4 Session Modification procedure to indicate the new I-UPF to send the buffered downlink packet(s) received from the UPF (PSA).

10. [Conditional] old UPF (intermediate) to UPF (PSA): buffered downlink data forwarding

If the old I-UPF is removed and no new I-UPF is assigned for the PDU Session and forwarding tunnel was established to the UPF (PSA), the old (intermediate) UPF forwards its buffered data to the UPF (PSA) acting as N3 Terminating Point. If indicated by SMF in step 7a, the UPF (PSA) reports to SMF when the end marker packet has been received. Then the SMF initiates N4 Session Modification procedure to request the UPF (PSA) to send the buffered DL data received from the N6 interface.

11. [Conditional] SMF to AMF: Nsmf\_PDUSession\_UpdateSMContext Response (N2 SM information (PDU Session ID, QFI(s), QoS profile(s), CN N3 Tunnel Info, S-NSSAI, User Plane Security Enforcement, UE Integrity Protection Maximum Data Rate, RSN), N1 SM Container, Cause) to the AMF. If the UPF that connects to RAN is the UPF (PSA), the N3 CN Tunnel Info is the UL CN Tunnel Info of the UPF (PSA). If the UPF that connects to RAN is the new intermediate UPF, the CN N3 Tunnel Info is the UL Tunnel Info of the intermediate UPF.

For the PDU Session with redundant I-UPFs or with redundant N3 tunnels for URLLC, the two UL N3 CN Tunnel Info are included, the SMF also indicates the NG-RAN that one of the CN Tunnel Info is used as the redundancy tunnel of the PDU session as described in clause 5.33.2.2 of TS 23.501 [2].

The SMF shall send N1 SM Container and/or N2 SM Information to the AMF when applicable. (e.g. when the SMF was notified from the AMF that the access type of the PDU Session can be changed in step 4).

For a PDU Session that the SMF has determined to accept the activation of UP connection in step 5a or 5b, the SMF generates only N2 SM information and sends Nsmf\_PDUSession\_UpdateSMContext Response to the AMF to establish the User Plane(s). The N2 SM information contains information that the AMF shall provide to the NG-RAN. The SMF may indicate for each QoS Flow whether redundant transmission shall be performed by a corresponding redundant transmission indicator. If the SMF decided to change the PSA UPF for the SSC mode 3 PDU Session, the SMF triggers the change of SSC mode 3 PDU Session anchor as an independent procedure described in clause 4.3.5.2 or clause 4.3.5.3 after accepting the activation of UP of the PDU Session.

The SMF can reject the activation of UP of the PDU Session by including a cause in the Nsmf\_PDUSession\_UpdateSMContext Response. Following are some of the cases:

- If the PDU Session corresponds to a LADN and the UE is outside the area of availability of the LADN as described in step 5b;

- If the AMF notified the SMF that the UE is reachable only for regulatory prioritized service, and the PDU Session to be activated is not for a regulatory prioritized service; or

- If the SMF decided to change the PSA UPF for the requested PDU Session as described in step 5b. In this case, after sending Nsmf\_PDUSession\_UpdateSMContext Response, the SMF triggers another procedure to instruct UE to re-establish the PDU Session as described in clause 4.3.5.1 for SSC mode 2.

- If the SMF received negative response in Step 6b due to UPF resource unavailability.

If the PDU Session has been assigned any EPS bearer ID, the SMF also includes the mapping between EPS bearer ID(s) and QFI(s) into the N2 SM information to be sent to the NG-RAN.

The User Plane Security Enforcement information is determined by the SMF upon PDU session establishment as described in clause 5.10.3 of TS 23.501 [2]. If the User Plane Security Enforcement information indicates that Integrity Protection is "Preferred" or "Required", the SMF also includes the UE Integrity Protection Maximum Data Rate.

The RSN is included when applicable, as determined by the SMF during PDU Session establishment as described in clause 5.33.2.1 of TS 23.501 [2].

12. AMF to (R)AN: N2 Request (N2 SM information received from SMF, security context, Mobility Restriction List, UE-AMBR, MM NAS Service Accept, list of recommended cells / TAs / NG-RAN node identifiers, UE Radio Capability, Core Network Assistance Information, Tracing Requirements, UE Radio Capability ID). The Allowed NSSAI for the Access Type for the UE is included in the N2 message. If the subscription information includes Tracing Requirements, the AMF includes Tracing Requirements in the N2 Request.

If the UE triggered the Service Request while in CM-CONNECTED state, only N2 SM information received from SMF and MM NAS Service Accept are included in the N2 Request.

If the Service Request procedure is triggered by the Network (as described in clause 4.2.3.3) while the UE is in CM-CONNECTED state, only N2 SM information received from SMF is included in the N2 Request.

If the Service Request procedure is triggered by the Network (as described in clause 4.2.3.3) while the UE is in CM-IDLE state, only N2 SM information received from SMF and MM NAS Service Accept is included in the N2 Request.

For a UE that was in CM-IDLE state when the Service Request was triggered, the NG-RAN stores the Security Context. If the Service Request is not triggered by UE for a signalling connection only, RAN also stores QoS Information for the QoS Flows of the PDU Sessions that are activated and N3 Tunnel IDs in the UE RAN context and Mobility Restriction List (as described in TS 23.501 [2] clause 5.3.4.1).

MM NAS Service Accept includes PDU Session status in AMF. Any local PDU Session Release during the Session Request procedure is indicated to the UE via the Session Status. PDU Session Reactivation Result is provided in Service Accept for the PDU sessions in the List Of PDU Sessions To Be Activated, and the PDU Session in the List of Allowed PDU Sessions which has caused paging or NAS notification. If the PDU Session Reactivation Result of a PDU Session is failure, the cause of the failure is also provided.

If there are multiple PDU Sessions that involves multiple SMFs, AMF does not need to wait for responses from all SMFs in step 11 before it sends N2 SM information to the RAN. However, the AMF shall wait for all responses from the SMFs before it sends MM NAS Service Accept message to the UE.

AMF shall include at least one N2 SM information from SMF if this step is triggered for PDU Session User Plane activation. AMF may send additional N2 SM information from SMFs in separate N2 message(s) (e.g. N2 tunnel setup request), if there is any. Alternatively, if multiple SMFs are involved, the AMF may send one N2 Request message to (R)AN after all the Nsmf\_PDUSession\_UpdateSMContext Response service operations from all the SMFs associated with the UE are received.

If the NG-RAN node had provided the list of recommended cells / TAs / NG-RAN node identifiers during the AN Release procedure (see clause 4.2.6), the AMF shall include it in the N2 Request. The NG-RAN may use this information to allocate the RAN Notification Area when the NG-RAN decides to enable RRC Inactive state for the UE.

The AMF includes the UE's "RRC Inactive Assistance Information" as defined in TS 23.501 [2] clause 5.3.3.2.5.

If the NG-RAN node does not support RACS and the AMF have UE Radio Capability ID but not the UE Radio Capability information, then AMF will use Nucmf\_UECapabilityManagement\_Resolve to try to retrieve the corresponding UE Radio Capability information.

If the NG-RAN node does not support RACS, or the AMF does not have UE Radio Capability ID in UE context, the AMF shall include the UE Radio Capability information, if available, to the NG-RAN node as described in TS 23.501 [2]. If the RAT Type is NB-IoT then NB-IoT specific UE Radio Access Capability Information is included instead, if available.

If AMF has UE Radio Capability ID in UE context valid for the PLMN the UE is currently in and the NG-RAN supports RACS, the AMF signals the UE Radio Capability ID. If the NG-RAN node does not have mapping between the UE Radio Capability ID and the corresponding UE radio capabilities, it shall use the non-UE associated procedure described in TS 38.413 [10] to retrieve the mapping from the AMF.

The AMF may include the Core Network Assistance Information which includes Core Network assisted RAN parameters tuning and Core Network assisted RAN paging information as defined in TS 23.501 [2].

If the UE included support for restriction of use of Enhanced Coverage, the AMF sends Enhanced Coverage Restricted information to the (R)AN in the N2 message.

If the UE and the AMF have negotiated to enable MICO mode and the AMF uses the Extended connected timer, then the AMF provides the Extended Connected time value to NG-RAN (see clause 5.31.7.3 of TS 23.501 [2]) in this step. The Extended Connected Time value indicates the minimum time the RAN should keep the UE in RRC-CONNECTED state regardless of inactivity.

If the AMF accepted MICO mode in the last registration procedure and knows there may be mobile terminated data or signalling pending, the AMF maintains the N2 connection for at least the Extended Connected Time as described in clause 5.31.7.3 of TS 23.501 [2], and provides the Extended Connected Time value to the RAN in N2 message with Service Accept message. The RAN should keep the UE in RRC-CONNECTED state for an Extended Connected Time period in order to ensure the downlink data and/or signalling is delivered to the UE.

If the RAN receives two CN Tunnel Info for a PDU session in step 11 for redundant transmission, RAN also allocates two AN Tunnel Info correspondingly, and indicate to SMF one of the AN Tunnel Info is used as the redundancy tunnel of the PDU session as described in clause 5.33.2.2 of TS 23.501 [2].

13. (R)AN to UE: The NG-RAN performs RRC Connection Reconfiguration with the UE depending on the QoS Information for all the QoS Flows of the PDU Sessions whose UP connections are activated and Data Radio Bearers. For a UE that was in CM-IDLE state, if the Service Request is not triggered by UE for a signalling connection only, the User Plane security is established at this step, which is described in detail in TS 38.331 [12] and TS 36.331 [16]. For a UE that was in CM-IDLE state, if the Service Request is triggered by UE for a signalling connection only, AS security context may be established in this step, which is described in detail in TS 38.331 [12] and TS 36.331 [16].

If the N2 Request includes a NAS message, the NG-RAN forwards the NAS message to the UE. The UE locally deletes context of PDU Sessions that are not available in 5GC.

NOTE 5: The reception of the Service Accept message does not imply the successful activation of the User Plane radio resources.

NOTE 6: If not all the requested User Plane AN resources are successfully activated, see TS 38.413 [10].

After the User Plane radio resources are setup, the uplink data from the UE can now be forwarded to NG-RAN. The NG-RAN sends the uplink data to the UPF address and Tunnel ID provided in the step 11.

If the NG-RAN can not establish redundant user plane for the PDU Session as indicated by the RSN parameter, the NG-RAN takes the decision on how to proceed with the PDU Session as described in TS 23.501 [2].

14. [Conditional] (R)AN to AMF: N2 Request Ack (List of PDU Sessions To Be Established with N2 SM information (AN Tunnel Info, List of accepted QoS Flows for the PDU Sessions whose UP connections are activated, List of rejected QoS Flows for the PDU Sessions whose UP connections are activated), List of PDU Sessions that failed to be established with the failure cause given in the N2 SM information element).

The message may include N2 SM information(s), e.g. AN Tunnel Info. NG-RAN may respond N2 SM information with separate N2 message (e.g. N2 tunnel setup response) if AMF sends separate N2 message in step 11.

If multiple N2 SM information are included in the N2 Request message in step 12, the N2 Request Ack includes multiple N2 SM information and information to enable the AMF to associate the responses to relevant SMF.

15. [Conditional] AMF to SMF: Nsmf\_PDUSession\_UpdateSMContext Request (N2 SM information, RAT Type, Access Type) per PDU Session to the SMF. The AMF determines Access Type and RAT Type, see clause 4.2.2.2.1.

If the AMF received N2 SM information (one or multiple) in step 14, then the AMF shall forward the N2 SM information to the relevant SMF per PDU Session ID. If the UE Time Zone has changed compared to the last reported UE Time Zone then the AMF shall include the UE Time Zone IE in this message.

If the PDU Session is moved from the non-3GPP access to 3GPP access (i.e. N3 tunnel for the PDU Session is established successfully), the SMF and AMF update associated access of the PDU Session. The UE updates associated access of the PDU Session when the user plane resource for the PDU Session is successfully established.

Procedure for unpausing a charging pause initiated earlier is specified in clause 4.4.4.

If a PDU Session is rejected by the serving NG-RAN with an indication that the PDU Session was rejected because User Plane Security Enforcement is not supported in the serving NG-RAN and the User Plane Enforcement Policy indicates "Required" as described in clause 5.10.3 of TS 23.501 [2], the SMF shall trigger the release of this PDU Session. In all other cases of PDU Session rejection, the SMF can decide whether to release the PDU Session or to deactivate the UP connection of this PDU Session.

If some of the QoS Flows of a PDU Session are not accepted by the serving NG-RAN, the SMF shall initiate the PDU Session Modification procedure to remove the non-accepted QoS Flows from the PDU Session after this procedure is completed.

16. [Optional] SMF to PCF: If dynamic PCC is deployed, SMF may initiate notification about new location information to the PCF (if subscribed) by performing an SMF initiated SM Policy Modification procedure as defined in clause 4.16.5.1. The PCF may provide updated policies.

17a. [Conditional] SMF to new intermediate UPF: N4 Session Modification Request (AN Tunnel Info and List of accepted QFI(s)).

If the SMF selected a new UPF to act as intermediate UPF for the PDU Session in step 5b, the SMF initiates a N4 Session Modification procedure to the new I-UPF and provides AN Tunnel Info. The Downlink Data from the new I-UPF can now be forwarded to NG-RAN and UE.

17b. [Conditional] UPF to SMF: N4 Session Modification Response.

18a. [Conditional] SMF to UPF (PSA): N4 Session Modification Request (AN Tunnel Info, List of rejected QoS Flows).

If a User Plane is to be setup or modified and after the modification there is no I-UPF, the SMF initiates a N4 Session Modification procedure to UPF (PSA) and provides AN Tunnel Info. The Downlink Data from the UPF (PSA) can now be forwarded to NG-RAN and UE.

For QoS Flows in the List of rejected QoS Flows, the SMF shall instruct the UPF to remove the rules (e.g., Packet Detection Rules etc.) which are associated with the QoS Flows.

If SMF decides to perform redundant transmission for one or more QoS Flows of the PDU, the SMF also indicates the UPF (PSA) to perform packet duplication for the QoS Flow(s) in downlink direction by forwarding rules.

18b. [Conditional] UPF to SMF: N4 Session Modification Response.

19. [Conditional] SMF to AMF: Nsmf\_PDUSession\_UpdateSMContext Response.

20a. [Conditional] SMF to new UPF (intermediate): N4 Session Modification Request.

If forwarding tunnel has been established to the new I-UPF and if the timer SMF set for forwarding tunnel at step 8a has expired, SMF sends N4 Session modification request to new (intermediate) UPF acting as N3 terminating point to release the forwarding tunnel.

20b. [Conditional] new UPF (intermediate) to SMF: N4 Session modification response.

New (intermediate) UPF acting as N3 terminating point sends N4 Session Modification response to SMF.

21a. [Conditional] SMF to UPF (PSA): N4 Session Modification Request.

If forwarding tunnel has been established to the UPF (PSA) and if the timer SMF set for forwarding tunnel at step 7b has expired, SMF sends N4 Session modification request to UPF (PSA) acting as N3 Terminating Point to release the forwarding tunnel.

21b. [Conditional] UPF (PSA) to SMF: N4 Session Modification Response.

UPF (PSA) acting as N3 Terminating Point sends N4 Session Modification Response to SMF.

22a. [Conditional] SMF to old UPF: N4 Session Modification Request or N4 Session Release Request.

If the SMF decided to continue using the old UPF in step 5b, the SMF sends an N4 Session Modification Request, providing AN Tunnel Info.

If the SMF decided to select a new UPF to act as intermediate UPF in step 5b, and the old UPF is not PSA UPF, the SMF initiates resource release, after timer in step 6b or 7b expires, by sending an N4 Session Release Request (Release Cause) to the old intermediate UPF.

22b. [Conditional] Old intermediate UPF to SMF: N4 Session Modification Response or N4 Session Release Response.

The old UPF acknowledges with an N4 Session Modification Response or N4 Session Release Response message to confirm the modification or release of resources.

For the mobility related events described in clause 4.15.4, the AMF invokes the Namf\_EventExposure\_Notify service operation after step 4.

Upon reception of the Namf\_EventExposure\_Notify with an indication that the UE is reachable, if the SMF has pending DL data the SMF invokes the Namf\_Communication\_N1N2MessageTransfer service operation to the AMF to establish the User Plane(s) for the PDU Sessions, otherwise the SMF resumes sending DL data notifications to the AMF in the case of DL data.

Upon reception of the Namf\_EventExposure\_Notify with an indication that UE is reachable only for regulatory prioritized service, the SMF deactivates the PDU Session if the service of the PDU Session is not regulatory prioritized. For home routed roaming case, the V-SMF triggers the deactivation of the PDU Session, in addition, the H-SMF refrains from sending downlink signalling if the signalling is not related to regulatory prioritized service upon receiving the notification.

\*\*\*\*\* NEXT CHANGE \*\*\*\*\*

#### 4.2.3.3 Network Triggered Service Request

This procedure is used when the network needs to signal (e.g. N1 signalling to UE, Mobile-terminated SMS, User Plane connection activation for PDU Session(s) to deliver mobile terminating user data) with a UE. When the procedure is triggered by SMSF, PCF, LMF, GMLC, NEF or UDM, the SMF in the following figure should be replaced by the respective NF. If the UE is in CM‑IDLE state or CM-CONNECTED state in 3GPP access, the network initiates a Network Triggered Service Request procedure. If the UE is in CM-IDLE state, and asynchronous type communication is not activated, the network sends a Paging Request to (R)AN/UE. The Paging Request triggers the UE Triggered Service Request procedure in the UE. If asynchronous type communication is activated, the network stores the received message and forward the message to the (R)AN and/or the UE (i.e. synchronizes the context with the (R)AN and/or the UE) when the UE enters CM-CONNECTED state.

If the UE is in CM-IDLE state in non-3GPP access and if the UE is simultaneously registered over 3GPP and non-3GPP accesses in a PLMN, the network shall initiate a Network Triggered Service Request procedure over 3GPP access.

If the UE is in CM-IDLE state in 3GPP access and in CM-CONNECTED state in non-3GPP access, and if the UE is simultaneously registered over 3GPP and non-3GPP accesses in the same PLMN, the network may initiate a Network Triggered Service Request procedure for 3GPP access via non-3GPP access.

For this procedure, the impacted SMF and UPF are all under control of the PLMN serving the UE, e.g. in Home Routed roaming case the SMF and UPF in HPLMN are not involved.

The procedure below covers the following non exhaustive list of use-cases for 3GPP access (detailed conditions of when the steps apply are stated in the procedure below):

- The SMF needs to setup N3 tunnel to deliver downlink packet to the UE for a PDU Session and the UE is in CM-IDLE state: Step 3a contains an N2 message and Step 4b (paging) is performed.

- The SMF needs to setup N3 tunnel to deliver downlink packet to the UE for a PDU Session and the UE is in CM-CONNECTED state: Step 3a contains an N2 message and Step 4a (UP reactivation) is performed.

- NF (e.g. SMF, SMSF, PCF or LMF) needs to send an N1 message to the UE, using the Namf\_Communication\_N1N2MessageTransfer service operation, and the UE is in CM-IDLE state: Step 3a contains an N1 message, Step 3b contains cause "Attempting to reach UE", and Step 4b (paging) occurs.

- The LMF triggers AMF, using the Namf\_Communication\_N1N2MessageTransfer service operation, to setup a NAS connection with the UE and the UE is in CM-IDLE state: Step 3b contains cause "Attempting to reach UE", and step 4b (paging) occurs.

- The GMLC triggers AMF, using the Namf\_Location\_ProvideLocation service operation, to setup a NAS connection with the UE and the UE is in CM-IDLE state: Step 4b (paging) occurs.

- The PCF needs to send a message to the UE, using the Npcf\_AMPolicyControl\_Create Response service operation, or the Npcf\_AMPolicyControl\_UpdateNotify service operation and the UE is in CM-IDLE state: Step 3a contains a message, and step 4b (paging) occurs.

- NF (e.g. SMSF or SMF) triggers AMF, using the Namf\_MT\_EnableUEReachability service operation, to setup a NAS connection with the UE and the UE is in CM-IDLE state: The trigger is specific to the procedure and Step 4b (paging) occurs.



Figure 4.2.3.3-1: Network Triggered Service Request

1. When a UPF receives downlink data for a PDU Session and there is no AN Tunnel Info stored in UPF for the PDU Session, based on the instruction from the SMF (as described in TS 23.501 [2], clause 5.8.3), the UPF may buffer the downlink data (steps 2a and 2b), or forward the downlink data to the SMF (step 2c).

2a. UPF to SMF: Data Notification (N4 Session ID, Information to identify the QoS Flow for the DL data packet, DSCP).

- On arrival of the first downlink data packet for any QoS Flow, the UPF shall send Data Notification message to the SMF, if the SMF has not previously notified the UPF to not send the Data Notification to the SMF (in which case the next steps are skipped).

- If the UPF receives downlink data packets for another QoS Flow in the same PDU Session, the UPF shall send another Data Notification message to the SMF.

- If the Paging Policy Differentiation feature (as specified in TS 23.501 [2] clause 5.4.3) is supported by the UPF and if the PDU Session type is IP, the UPF shall also include the DSCP in TOS (IPv4) / TC (IPv6) value from the IP header of the downlink data packet and the information to identify the QoS Flow for the DL data packet.

2b. SMF to UPF: Data Notification Ack.

2c. The UPF forwards the downlink data packets towards the SMF if the SMF instructed the UPF to do so (i.e. the SMF will buffer the data packets).

- If the Paging Policy Differentiation feature is supported by the SMF and if the PDU Session type is IP, the SMF determines the Paging Policy Indicator based on the DSCP in TOS (IPv4) / TC (IPv6) value from the IP header of the received downlink data packet and identifies the corresponding QoS Flow from the QFI of the received DL data packet.

3a. [Conditional] SMF to AMF: Namf\_Communication\_N1N2MessageTransfer (SUPI, PDU Session ID, N1 SM container (SM message), N2 SM information (QFI(s), QoS profile(s), CN N3 Tunnel Info, S-NSSAI), Area of validity for N2 SM information, ARP, Paging Policy Indicator, 5QI, N1N2TransferFailure Notification Target Address, Extended Buffering support), or NF to AMF: Namf\_Communication\_N1N2MessageTransfer (SUPI, N1 message).

The SMF shall not include both N1 SM Container and N2 SM Information in Namf\_Communication\_N1N2MessageTransfer unless the N1 SM Container is related to the N2 SM Information.

If this step is triggered by a notification from UPF, upon reception of a Data Notification message, for a PDU Session corresponding to a LADN, the SMF takes actions as specified in TS 23.501 [2], clause 5.6.5. The SMF may notify the UPF that originated the Data Notification to discard downlink data for the PDU Sessions and/or to not provide further Data Notification messages.

Otherwise, the SMF determines whether to contact the AMF. The SMF does not contact the AMF:

- if the SMF had previously been notified that the UE is unreachable; or

- if the UE is reachable only for regulatory prioritized service and the PDU Session is not for regulatory prioritized service.

The SMF determines the AMF and invokes the Namf\_Communication\_N1N2MessageTransfer to the AMF including the PDU Session ID of the PDU Session. If this step is triggered by a notification from the UPF in step 2a, the SMF determines the PDU Session ID based on the N4 Session ID received in step 2a.

The SMF determines whether Extended Buffering applies based on local policy and the capability of the SMF (for SMF-based buffering) or the capability of the UPF (for UPF-based buffering). If Extended Buffering applies, the SMF includes "Extended Buffering support" indication in Namf\_Communication\_N1N2MessageTransfer.

If the SMF, while waiting for the User Plane Connection to be activated, receives any additional Data Notification message or, in the case that the SMF buffers the data packets, additional data packets for a QoS Flow associated with a higher priority (i.e. ARP priority level) than the priority indicated to the AMF in the previous Namf\_Communication\_N1N2MessageTransfer, or the SMF derive a different Paging Policy Indicator according to the additional Data Notification or the DSCP of the data packet, the SMF invokes a new Namf\_Communication\_N1N2MessageTransfer indicating the higher priority or different Paging Policy Indicator to the AMF.

If the SMF, while waiting for the User Plane to be activated, receives a message from a new AMF other than the one to which the SMF invoked theNamf\_Communication\_N1N2MessageTransfer, the SMF re-invokes the Namf\_Communication\_N1N2MessageTransfer towards the new AMF.

When supporting Paging Policy Differentiation, the SMF determines the Paging Policy Indicator related to the downlink data that has been received from the UPF or triggered the Data Notification message, based on the DSCP as described in TS 23.501 [2] clause 5.4.3, and indicates the Paging Policy Indicator in the Namf\_Communication\_N1N2MessageTransfer.

NOTE 1: AMF may receive request message(s) from other network functions which leads to signalling towards UE/RAN, e.g. Network-initiated Deregistration, SMF initiated PDU Session Modification. If the UE is in CM-CONNECTED state and the AMF only delivers N1 message towards UE, the flow continues in step 6 below.

The N2 SM information is optional and is not provided e.g. in the case that the SMF only wants to send an N1 message such as PDU Session Modification Command with only updating the UE with a PCO.

3b. [conditional] The AMF responds to the SMF.

If the UE is in CM-IDLE state at the AMF, and the AMF is able to page the UE the AMF sends a Namf\_Communication\_N1N2MessageTransfer response to the SMF immediately to indicate to the SMF that AMF is attempting to reach UE and the N2 SM information provided in step 3a, may be ignored by the AMF once the UE is reachable and the SMF may be asked to provide the N2 SM information again.

While waiting for the UE to respond to a previous paging request, if the AMF receives an Namf\_Communication\_N1N2MessageTransfer Request message with the same or a lower priority than the previous message triggering the paging, or if the AMF has determined not to trigger additional paging requests for this UE based on local policy, the AMF rejects the Namf\_Communication\_N1N2MessageTransfer Request message.

If the UE is in CM-CONNECTED state at the AMF then the AMF sends a Namf\_Communication\_N1N2MessageTransfer response to the SMF immediately to indicate that the N1/N2 message has been sent out.

If the UE is in CM-IDLE state, and the AMF determines that the UE is not reachable for paging, the AMF shall send an Namf\_Communication\_N1N2MessageTransfer response to the NF from which AMF received the request message in step 3a to indicate that the UE is not reachable, or the AMF performs asynchronous type communication and stores the UE context based on the received message, it shall send an Namf\_Communication\_N1N2MessageTransfer response to indicate that asynchronous type communication is invoked. If asynchronous type communication is invoked, the AMF initiates communication with the UE and (R)AN when the UE is reachable e.g. when the UE enters CM-CONNECTED state.

If the AMF has determined the UE is unreachable for the SMF (e.g., due to the UE in MICO mode, the UE using extended idle mode DRX or the UE is only registered over non-3GPP access and its state is CM-IDLE), then the AMF rejects the request from the SMF. The AMF may include in the reject message an indication that the SMF need not trigger the Namf\_Communication\_N1N2MessageTransfer Request to the AMF, if the SMF has not subscribed to the event of the UE reachability. If the SMF included the Extended Buffering Support indication, the AMF indicates the Estimated Maximum Wait time, in the reject message, for the SMF to determine the Extended Buffering time. If the UE is in MICO mode, the AMF determines the Estimated Maximum Wait time based on the next expected periodic registration by the UE or by implementation. If the UE is using extended idle mode DRX, the AMF determines the Estimated Maximum Wait time based on the start of the next Paging Time Window. The AMF stores an indication that the SMF has been informed that the UE is unreachable.

If the AMF has determined the UE is reachable and the AMF detects the UE is in a Non-Allowed Area unless the request from the SMF is for regulatory prioritized service, the AMF rejects the request from the SMF and notifies the SMF that the UE is reachable only for regulatory prioritized service. The AMF stores an indication that the SMF has been informed that the UE is reachable only for regulatory prioritized service.

If the Registration procedure with AMF change is in progress when the old AMF receives the Namf\_Communication\_N1N2MessageTransfer, the old AMF may reject the request with an indication that the Namf\_Communication\_N1N2MessageTransfer has been temporarily rejected.

Upon reception of an Namf\_Communication\_N1N2MessageTransfer response with an indication that its request has been temporarily rejected, the SMF shall start a locally configured guard timer and wait for any message to come from an AMF. Upon reception of a message from an AMF, the SMF shall re-invoke the Namf\_Communication\_N1N2MessageTransfer (with N2 SM info and/or N1 SM info) to the AMF from which it received the message. Otherwise the SMF takes the step 3c at expiry of the guard timer. If the SMF decides that the control plane buffering applies, the SMF shall request UPF to start forwarding the downlink data PDU towards the SMF.

3c. [Conditional] SMF responds to the UPF

SMF may notify the UPF about the User Plane setup failure.

If the SMF receives an indication from the AMF that the UE is unreachable or reachable only for regulatory prioritized service and the SMF determines that Extended Buffering does not apply, the SMF may, based on network policies, either:

- indicate to the UPF to stop sending Data Notifications;

- indicate to the UPF to stop buffering DL data and discard the buffered data;

- indicate to the UPF to stop sending Data Notifications and stop buffering DL data and discard the buffered data; or

- refrains from sending further Namf\_Communication\_N1N2MessageTransfer message for DL data to the AMF while the UE is unreachable.

Then the SMF subscribes to the AMF for UE reachability event notifications.

Based on operator policies, the SMF applies the pause of charging procedure as specified in clause 4.4.4.

If the SMF receives an indication from the AMF that the Namf\_Communication\_N1N2MessageTransfer message requested from an SMF has been temporarily rejected, the SMF may, based on network policies, indicate to the UPF to apply temporary buffering.

If the SMF receives an "Estimated Maximum Wait time" from the AMF and Extended Buffering applies, the SMF may either:

- If the DL data buffering in the SMF applies, store the DL Data for an Extended Buffering time. The SMF does not send any additional Namf\_Communication\_N1N2MessageTransfer message if subsequent downlink data packets are received. If the Extended Buffering timer expires, the SMF discards the buffered downlink data.

- If the DL data buffering in the UPF applies, send a Failure indication with an indication to the UPF to buffer the DL data with an Extended Buffering time and optionally a DL Buffering Suggested Packet Count. The Suggested Number of Downlink Packets network configuration parameter (if available) may be used to derive the value for DL Buffering Suggested Packet Count. The SMF may also indicate to the UPF to stop sending Data Notifications.

The Extended Buffering time is determined by the SMF and should be larger or equal to the Estimated Maximum Wait time received from the AMF.

If the UPF receives an Extended Buffering indication from the SMF, the UPF initiates Extended Buffering of the downlink data and starts an Extended Buffering timer. If the Extended Buffering timer expires, the UPF discards the buffered downlink data.

4a. [Conditional] If the UE is in CM-CONNECTED state in the access associated with the PDU Session ID received from the SMF in step 3a, the steps 4 to 22 in UE Triggered Service Request procedure (see clause 4.2.3.2) are performed for this PDU Session (i.e. establish the radio resources and, in the case that the User Plane is to be activated, to establish the N3 tunnel) without sending a Paging message to the (R)AN node and the UE. In step 12 of clause 4.2.3.2, the AMF does not send the NAS Service Accept message to the UE. The rest of this procedure is omitted.

4b. [Conditional] If the UE is in CM-IDLE state in 3GPP access and the PDU Session ID received from the SMF in step 3a has been associated with 3GPP access and based on local policy the AMF decides to notify the UE through 3GPP access even when UE is in CM-CONNECTED state for non-3GPP access, the AMF may send a Paging message to NG-RAN node(s) via 3GPP access.

If the UE is simultaneously registered over 3GPP and non-3GPP accesses in the same PLMN, the UE is in CM-IDLE state in both 3GPP access and non-3GPP access, and the PDU Session ID in step 3a is associated with non-3GPP access, the AMF sends a Paging message with associated access "non-3GPP" to NG-RAN node(s) via 3GPP access.

If the UE is in RM-REGISTERED state and CM-IDLE and reachable in 3GPP access, the AMF sends a Paging message (NAS ID for paging, Registration Area list, Paging DRX length, Paging Priority, access associated to the PDU Session, Enhanced Coverage Restricted information, WUS Assistance Information) to (R)AN node(s) belonging to the Registration Area(s) in which the UE is registered, then the NG-RAN node pages the UE, including the access associated to the PDU Session in the paging message if received from the AMF, see TS 38.331 [12]. If extended idle mode DRX was accepted by the AMF in the last registration procedure, the AMF includes extended idle mode DRX cycle length and Paging Time Window in the Paging message. The AMF shall ensure that the correct Paging DRX length is provided based on the accepted UE Specific DRX of the current RAT.

NOTE 2: The usage of the Access associated with a PDU Session when paging an UE is defined in TS 23.501 [2] clause 5.6.8.

NOTE 3: This step is performed also when the UE and the network support User Plane CIoT 5GS Optimisation and the previous RRC connection has been suspended.

Different paging strategies may be configured in the AMF for different combinations of DNN, Paging Policy Indicator (if supported), ARP and 5QI.

For RRC-inactive state, the paging strategies may be configured in the (R)AN for different combinations of Paging Policy Indicator, ARP and 5QI.

Paging Priority is included only:

- if the AMF receives an Namf\_Communication\_N1N2MessageTransfer message with an ARP value associated with priority services (e.g., MPS, MCS), as configured by the operator.

- One Paging Priority level can be used for multiple ARP values. The mapping of ARP values to Paging Priority level (or levels) is configured by operator policy in the AMF and in NG-RAN.

The (R)AN may prioritise the paging of UEs according to the Paging Priority.

If the AMF, while waiting for a UE response to the Paging Request message sent without Paging Priority, receives an Namf\_Communication\_N1N2MessageTransfer message, which indicates an ARP value associated with priority services (e.g., MPS, MCS), as configured by the operator, the AMF shall send another paging message with the suitable Paging Priority. For subsequent received Namf\_Communication\_N1N2MessageTransfer messages with the same or higher priority, the AMF may determine whether to send the Paging message with suitable Paging Priority based on local policy.

Paging strategies may include:

- paging retransmission scheme (e.g. how frequently the paging is repeated or with what time interval);

- determining whether to send the Paging message to the (R)AN nodes during certain AMF high load conditions;

- whether to apply sub-area based paging (e.g. first page in the last known cell-id or TA and retransmission in all registered TAs).

NOTE 4: Setting of Paging Priority in the Paging message is independent from any paging strategy.

The AMF and the (R)AN may support further paging optimisations in order to reduce the signalling load and the network resources used to successfully page a UE by one or several of the following means:

- by the AMF implementing specific paging strategies (e.g. the N2 Paging message is sent to the (R)AN nodes that served the UE last);

- by the AMF considering Information On Recommended Cells And NG-RAN nodes provided by the (R)AN at transition to CM-IDLE state. The AMF takes the (R)AN nodes related part of this information into account to determine the (R)AN nodes to be paged, and provides the information on recommended cells within the N2 Paging message to each of these (R)AN nodes;

- by the (R)AN considering the Paging Attempt Count Information provided by the AMF at paging.

If the UE Radio Capability for Paging Information is available in the AMF, the AMF adds the UE Radio Capability for Paging Information in the N2 Paging message to the (R)AN nodes.

If the Information On Recommended Cells And (R)AN nodes For Paging is available in the AMF, the AMF shall take that information into account to determine the (R)AN nodes for paging and, when paging a (R)AN node, the AMF may transparently convey the information on recommended cells to the (R)AN node.

The AMF may include in the N2 Paging message(s) the paging attempt count information. The paging attempt count information shall be the same for all (R)AN nodes selected by the AMF for paging.

If the AMF has Paging Assistance Data for CE capable UE stored in the UE Context in AMF, and Enhanced Coverage is not restricted for the UE then the AMF shall include Paging Assistance Data for CE capable UE in the N2 paging message for all NG-RAN nodes selected by the AMF for paging.

The AMF may include in the N2 Paging message(s) the WUS Assistance Information, if available. If the WUS Assistance Information is included by the N2 Paging message, the NG-eNB takes it into account when paging the UE (see TS 36.300 [46]).

The AMF may include in the N2 paging message the PLMN ID(s) of Serving PLMN and equivalent PLMN(s) supported by NG-RAN, and corresponding CAG information per PLMN ID which including an Allowed CAG list and optionally an indication whether the UE is only allowed to access 5GS via CAG cells, if available. If the above information is included in N2 paging message, the NG-RAN node may take it into account when determining the cells where paging will be performed (see TS 38.413 [10]).

If the UE and NG-eNB support WUS, then:

- if the NGAP Paging message contains the *Assistance Data for Recommended Cells* IE (see TS 38.413 [10]), the NG-eNB shall only broadcast the UE's Wake Up Signal in the last used cell;

- else (i.e. the *Assistance Data for Recommended Cells* IE is not included in the NGAP Paging message) the eNodeB should not broadcast the UE's Wake Up Signal.

4c. [Conditional] If the UE is simultaneously registered over 3GPP and non-3GPP accesses in the same PLMN, and the UE is in CM-CONNECTED state in 3GPP access and the PDU Session ID in step 3a is associated with non-3GPP access, the AMF sends a NAS Notification message containing the non-3GPP Access Type to the UE over 3GPP access and sets a Notification timer. Step 5 is omitted.

If the UE is simultaneously registered over 3GPP and non-3GPP accesses in the same PLMN, and the UE is in CM-CONNECTED state for non-3GPP access and in CM-IDLE for 3GPP access, and if the PDU Session ID in step 3a is associated with 3GPP access, and based on local policy the AMF decides to notify the UE through non-3GPP access, the AMF may send a NAS Notification message containing the 3GPP Access Type to the UE over non-3GPP access and sets a Notification timer.

NOTE 5: This step is performed also when the UE and the network support User Plane CIoT 5GS Optimisation in 3GPP access and the previous RRC connection has been suspended.

5. [Conditional] AMF to SMF: Namf\_Communication\_N1N2Transfer Failure Notification.

The AMF supervises the paging procedure with a timer. If the AMF receives no response from the UE to the Paging Request message, the AMF may apply further paging according to any applicable paging strategy described in step 4b.

The AMF notifies the SMF by sending Namf\_Communications\_N1N2MessageTransfer Failure Notification to the Notification Target Address provided by the SMF in step 3a if the UE does not respond to paging, unless the AMF is aware of an ongoing MM procedure that prevents the UE from responding, i.e. the AMF receives an N14 Context Request message indicating that the UE performs Registration procedure with another AMF.

When a Namf\_Communication\_N1N2Transfer Failure Notification is received, SMF informs the UPF (if applicable).

Procedure for pause of charging at SMF is specified in clause 4.4.4.

6. If the UE is in CM-IDLE state in 3GPP access, upon reception of paging request for a PDU Session associated to 3GPP access, the UE shall initiate the UE Triggered Service Request procedure (clause 4.2.3.2) or, if the UE is enabled to use User Plane CIoT 5GS Optimisation and there is suspended access stratum context stored in the UE, the UE initiates the Connection Resume in CM-IDLE with Suspend procedure (clause 4.8.2.3). To support the buffered data forwarding, the SMF instruct the UPF to establish a Data forwarding tunnel between the old UPF and the new UPF or to the PSA as described at steps 6a, 7a, 8a of clause 4.2.3.2.

If the MUSIM UE is in CM-IDLE state in 3GPP access, upon reception of paging request for a PDU Session associated to 3GPP access and if the UE decides not to accept the paging, the UE attempts to send a Busy Indication via the UE Triggered Service Request procedure (clause 4.2.3.2) unless it is unable to do so e.g. due to UE implementation constraints. After receiving the Busy Indication, the AMF notifies the SMF by sending Namf\_Communication\_N1N2MessageTransfer Failure Notification indicating that the N1 transfer failed, but the UE is still reachable.

NOTE X: The new failure cause is defined by stage 3, supporting that later MT triggered services still triggers new paging events for the UE. New DL data on same or other QoS Flow can trigger paging after the above mentioned N1 failure notification.

If the UE is in CM-IDLE state in both non-3GPP and 3GPP accesses, upon reception of paging request for a PDU Session associated to non-3GPP access, the UE shall initiate the UE Triggered Service Request procedure (clause 4.2.3.2) which shall contain the List Of Allowed PDU Sessions that, according to UE policies and whether the S-NSSAIs of these PDU Sessions are within the Allowed NSSAI for 3GPP access, can be re-activated over the 3GPP access. If there is no PDU Session that can be re-activated over the 3GPP access, the UE includes an empty List Of Allowed PDU Sessions. If the AMF receives a Service Request message from the UE via non-3GPP access as described in clause 4.12.4.1 (e.g. because the UE successfully connects to a non-3GPP access), the AMF stops the paging procedure and processes the received Service Request procedure. If the AMF receives the Service Request message and the List Of Allowed PDU Sessions provided by the UE does not include the PDU Session for which the UE was paged, the AMF notifies the SMF that the UE was reachable but did not accept to re-activate the PDU Session by invoking Namf\_EventExposure\_Notify service as described in step 4 of clause 4.2.3.2.

If the UE is in CM-IDLE state in non-3GPP access and in CM-CONNECTED state in 3GPP access, upon reception of NAS Notification message over 3GPP access containing the non-3GPP Access Type, the UE shall initiate the UE Triggered Service Request procedure (clause 4.2.3.2) with the List Of Allowed PDU Sessions that, according to UE policies and whether the S-NSSAIs of these PDU Sessions are within the Allowed NSSAI for 3GPP access, can be re-activated over the 3GPP access. If there is no PDU Session that can be re-activated over the 3GPP access, the UE include an empty List Of Allowed PDU Sessions. When the AMF receives the Service Request message and the List of Allowed PDU Sessions provided by the UE does not include the PDU Session for which the UE was notified, the AMF notifies the SMF that the UE was reachable but did not accept to re-activate the PDU Session by invoking Namf\_EventExposure\_Notify service. If the AMF receives a Service Request message from the UE via non-3GPP access as described in clause 4.12.4.1 (e.g. because the UE successfully connects to a non-3GPP access), the AMF stops the Notification timer and processes the received Service Request procedure.

- Alternatively, if the UE is in CM-IDLE state in non-3GPP access with the Mobility Management back-off timer running, upon reception of Paging Message over 3GPP access containing the non-3GPP Access Type, the UE on stopping the back-off timer (for both accesses), shall initiate the UE Triggered Service Request procedure (clause 4.12.4.1) over non-3GPP access if non-3GPP access is available. When the AMF receives a Service Request message from the UE via non-3GPP access, the AMF stops the Paging timer and processes the received Service Request.

NOTE 6: A scenario where the UE is CM-IDLE over non-3GPP access and yet non-3GPP access is available, is when the UE over the non-3GPP access is running the Mobility Management back-off timer and network has released the NAS signalling connection upon service reject.

If the UE is in CM-IDLE state in 3GPP access and in CM-CONNECTED state in non-3GPP access, upon reception of NAS Notification message over non-3GPP access identifying the 3GPP access type, the UE shall initiate the UE triggered Service Request procedure (clause 4.2.3.2) over the 3GPP access when 3GPP access is available. If the AMF does not receive the Service Request message before Notification timer expires, the AMF may either page the UE through 3GPP access or notify the SMF that the UE was not able to re-activate the PDU Session.

The User Plane of all PDU Sessions for URLLC shall be activated during the Service Request procedure if the UE initiates the Service Request from 3GPP access in CM-IDLE state as described in clause 4.2.3.2.

7. If the AMF has paged the UE to trigger the Service Request Procedure, the AMF shall initiate the UE configuration update procedure as defined in clause 4.2.4.2 to assign a new 5G-GUTI. If the UE response in the Service Request includes a Busy Indication, the AMF immediately triggers the release of the UE after receiving the UE Configuration Update complete message.

NOTE X: If the UE response in the Service Request includes a Busy Indication, it is preferred that the AMF acknowledges the receipt of the Busy Indication together with the first message in the UE configuration update procedure as defined in clause 4.2.4.2. It is up to stage 3 to decide on any protocol optimizations.

8. The UPF transmits the buffered downlink data toward UE via (R)AN node which performed the Service Request procedure. If data is buffered in the SMF, the SMF delivers buffered downlink data to the UPF.

The network also sends downlink signalling to the UE if the procedure is triggered due to request from other NFs, as described in step 3a.

\*\*\*\*\* NEXT CHANGE \*\*\*\*\*

##### 5.2.2.2.7 Namf\_Communication\_N1N2MessageTransfer service operation

**Service operation name:** Namf\_Communication\_N1N2MessageTransfer.

**Description:** CN NF request to transfer downlink N1 and/or N2 message to the UE and/or AN through the AMF.

**Input, Required:** CN NF ID, Message type (N1 or N2 or both), Message Container (s) where at least one of the message containers (N1 or N2) is required.

**Input, Optional:** last message indication, Session ID, Paging Policy Indicator, ARP, Area of validity for the N2 SM information, 5QI, N1N2TransferFailure Notification Target Address, type of N2 SM information, type of N2 NRPPa information, Extended Buffering Support. MA PDU session Accepted indication, target access type (3GPP access or non-3GPP access).

Namf\_Communication\_N1N2MessageTransfer supports the transfer of only one N2 message. N2 SM information and N2 NRPPa information are mutually exclusive.

**Output, Required:** Result indication*.*

**Output, Optional:** Redirection information, Estimated Maximum wait time*.*

If the UE is in CM-IDLE state, the AMF initiates the network triggered service request procedure as specified in clause 4.2.3.3 and responds to the consumer NF with a result indication, "attempting to reach UE". Otherwise, the AMF responds to the consumer NF, with a Namf\_Communication\_N1N2MessageTransfer response, providing a result indication of whether the AMF was able to successfully transfer the N1 and/or the N2 message towards the UE and/or the AN. A result indication of "N1/N2 transfer success" does not mean that N1 message is successfully received by the UE. It only means that the AMF is able to successfully send the N1 or N2 message towards the AN.

The "Area of validity for the N2 SM information", if included is used by the AMF to determine whether the N2 SM information provided by the consumer NF can be used towards the AN based on the current location of the UE. If the location of the UE is outside the "Area of validity for the N2 SM information" indicated, the AMF shall not send the N2 SM information to the AN.

If the consumer NF knows that a specific downlink N1 message is the last message to be transferred in this transaction, the consumer NF shall include the last message indication in the Namf\_Communication\_N1N2MessageTransfer service operation so that the AMF knows that the no more downlink N1 message need to be transferred for this transaction.

The CN NF is implicitly subscribed to be notified of N1N2TransferFailure by providing the N1N2TransferFailure Notification Target Address. When AMF detects that the UE fails to response to paging, or the UE responds to paging with a Busy Indication, or the AMF determines the UE is temporarily unreachable e.g. due to extended idle mode DRX or MICO mode, the AMF invokes the Namf\_Communication\_N1N2TransferFailureNotification to provide the failure notification to the location addressed by N1N2TransferFailure Notification Target Address.

The "Extended Buffering applies" indication, if included, is used by the AMF to include "Estimated Maximum Wait time" in Namf\_Communication\_N1N2 TransferFailureNotification if invoked due to the UE being unreachable.

If the result of the service operation fails, the AMF shall set the corresponding cause value in the result indication which can be used by the NF consumer for further action. If the related UE is not served by AMF and the AMF knows which AMF is serving the UE, the AMF provides redirection information which can be used by the consumer NF to resend UE related message to the AMF that serves the UE.

If the consumer NF is a SMF and he request includes N2 SM information, the SMF indicates the type of N2 SM information. If the consumer NF is a LMF and the request includes N2 NRPPa information, the LMF indicates the type of N2 NRPPa information.

NOTE: The actual N2 SM information or N2 NRPPa information is not interpreted by the AMF.

The Small Data Rate Control Status is included if a PDU Session is being released and the UPF or NEF provided Small Data Rate Control Status when the PDU Session was released for the AMF to store.

For the usage of MA PDU session Accepted indication and target access type (3GPP access or non-3GPP access) see clauses 4.22.2, 4.22.3, 4.22.6.3 and 4.22.9.4.

\*\*\*\*\* NEXT CHANGE \*\*\*\*\*

##### 5.2.2.2.7A Namf\_Communication\_N1N2TransferFailureNotification service operation

**Service operation name:** Namf\_Communication\_N1N2TransferFailureNotification.

**Description:** The AMF uses this notification to inform the NF service consumer that initiated an earlier Namf\_Communication\_N1N2MessageTransfer, that the AMF failed to deliver the N1 message to the UE as the UE failed to respond to paging, or the UE responded with a Busy Indication.

**Input, Required:** Cause, N1N2MessageTransfer Notification Target Address.

**Input, Optional:** Estimated Maximum wait time.

**Output, Required:** None.

**Output, Optional:** None.

\*\*\*\*\* END OF CHANGES \*\*\*\*\*