**3GPP TSG-WG SA2 Meeting #140E e-meeting  *S2-200xxxx***

**Elbonia, August 19 – September 02, 2020**

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| *CR-Form-v12.0* |
| **CHANGE REQUEST** |
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|  | **23.502** | **CR** |  | **rev** |  | **Current version:** | **16.5.0** |  |
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| *For* [***HELP***](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:***  | Procedures of utilizing backhaul related information during the PDU session establishment procedure |
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| ***Source to WG:*** | TNO |
| ***Source to TSG:*** | SA2 |
|  |  |
| ***Work item code:*** | 5GSAT\_ARCH |  | ***Date:*** | 2020-07-17 |
|  |  |  |  |  |
| ***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 canbe found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | *Use one of the following releases:Rel-8 (Release 8)Rel-9 (Release 9)Rel-10 (Release 10)Rel-11 (Release 11)Rel-12 (Release 12)Rel-13 (Release 13)Rel-14 (Release 14)Rel-15 (Release 15)Rel-16 (Release 16)* |
|  |  |
| ***Reason for change:*** | Usage of satellite access for backhauling might introduce additional latency compared to e.g. fiber backhauls. The existence of a satellite link in (part of) the backhaul can be identified by AMF or UPF. This information subsequently needs to be transferred to SMF and PCF in order to select/adapt the choice of QoS Profile.  |
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| ***Summary of change:*** | Adaptation of procedures/functions that account for possible usage of satellite links in backhaul that might affect QoS Profile selection/adaptation process. Besides, 5GC aware of the satellite category can determine whether a PDU session establishment/modification request can be accepted.  |
|  |   |
| ***Consequences if not approved:*** | In case 5GC is not aware of the existence of satellite link(s) in the backhaul might result in degradation of QoS provided to the end-user.  |
|  |  |
| ***Clauses affected:*** | 7.10 |
|  |  |
|  | **Y** | **N** |  |  |
| ***Other specs*** |  | **X** |  Other core specifications  |  |
| ***affected:*** |  | **X** |  Test specifications |  |
| ***(show related CRs)*** |  | **X** |  O&M Specifications |  |
|  |  |
| ***Other comments:*** |  |
|  |  |
| ***This CR's revision history:*** |  |

### 4.2.7 N2 procedures

\*\*\* Begin of Change \*\*\*

#### 4.2.7.x Procedures of detecting backhaul related information via N2 interface

If an AN node establishes a TNL association with the AMF via satellite backhaul, it includes the satellite backhaul related information in the AMF CONFIGURATION UPDATE ACKNOWLEDGE message sent to the AMF.



Figure 4.2.7.x-1: AMF CONFIGURATION UPDATE procedure

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

#### 4.3.2.2 UE Requested PDU Session Establishment

##### 4.3.2.2.1 Non-roaming and Roaming with Local Breakout

1. From UE to AMF: NAS Message (S-NSSAI(s), UE Requested DNN, PDU Session ID, Request type, Old PDU Session ID, N1 SM container (PDU Session Establishment Request, [Port Management Information Container])).

 In order to establish a new PDU Session, the UE generates a new PDU Session ID.

 The UE initiates the UE Requested PDU Session Establishment procedure by the transmission of a NAS message containing a PDU Session Establishment Request within the N1 SM container. The PDU Session Establishment Request includes a PDU session ID, Requested PDU Session Type, a Requested SSC mode, 5GSM Capability, PCO, SM PDU DN Request Container, [Number Of Packet Filters], [Header Compression Configuration], UE Integrity Protection Maximum Data Rate, and [Always-on PDU Session Requested].

 The Request Type indicates "Initial request" if the PDU Session Establishment is a request to establish a new PDU Session and indicates "Existing PDU Session" if the request refers to an existing PDU Session switching between 3GPP access and non-3GPP access or to a PDU Session handover from an existing PDN connection in EPC. If the request refers to an existing PDN connection in EPC, the S-NSSAI is set as described in TS 23.501 [2] clause 5.15.7.2

 When Emergency service is required and an Emergency PDU Session is not already established, a UE shall initiate the UE Requested PDU Session Establishment procedure with a Request Type indicating "Emergency Request".

 The Request Type indicates "Emergency Request" if the PDU Session Establishment is a request to establish a PDU Session for Emergency services. The Request Type indicates "Existing Emergency PDU Session" if the request refers to an existing PDU Session for Emergency services switching between 3GPP access and non-3GPP access or to a PDU Session handover from an existing PDN connection for Emergency services in EPC.

 The 5GSM Core Network Capability is provided by the UE and handled by SMF as defined in TS 23.501 [2] clause 5.4.4b.

 The Number Of Packet Filters indicates the number of supported packet filters for signalled QoS rules for the PDU Session that is being established. The number of packet filters indicated by the UE is valid for the lifetime of the PDU Session. For presence condition, see TS 24.501 [25].

 The UE Integrity Protection Maximum Data Rate indicates the maximum data rate up to which the UE can support UP integrity protection. The UE shall provide the UE Integrity Protection Data Rate capability independently of the Access Type over which the UE sends the PDU Session Establishment Request.

 If the use of header compression for Control Plane CIoT 5GS optimisation was negotiated successfully between the UE and the network in the previous registration procedure, the UE shall include the Header Compression Configuration, unless "Unstructured" or "Ethernet" PDU Session Type is indicated.

 The NAS message sent by the UE is encapsulated by the AN in a N2 message towards the AMF that should include User location information and Access Type Information.

 The PDU Session Establishment Request message may contain SM PDU DN Request Container containing information for the PDU Session authorization by the external DN.

 The UE includes the S-NSSAI from the Allowed NSSAI of the current access type. If the Mapping of Allowed NSSAI was provided to the UE, the UE shall provide both the S-NSSAI of the VPLMN from the Allowed NSSAI and the corresponding S-NSSAI of the HPLMN from the Mapping Of Allowed NSSAI.

 If the procedure is triggered for SSC mode 3 operation, the UE shall also include the Old PDU Session ID which indicates the PDU Session ID of the on-going PDU Session to be released, in NAS message. The Old PDU Session ID is included only in this case.

\*\*\* Begin of Change \*\*\*

 The AMF receives from the AN the NAS SM message (built in step 1) together with User Location Information (e.g. Cell Id in the case of the NG-RAN). After reception of the UE to AMF NAS message, the AMF may determine whether the UE is accessing the network via satellite backhaul. If yes, the AMF shall determine the satellite category (GEO, MEO, LEO).

NOTE: The AMF determines the satellite category either by configuration, or by signalling over the N2 interface during NG-AP Setup. If and how to signal the satellite category to the AMF is determined by RAN3.

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

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

 If the UE is establishing a PDU session for IMS, and the UE is configured to discover the P-CSCF address during connectivity establishment, the UE shall include an indicator that it requests a P‑CSCF IP address(es) within the SM container.

 The PS Data Off status is included in the PCO in the PDU Session Establishment Request message.

 The UE capability to support Reliable Data Service is included in the PCO in the PDU Session Establishment Request message.

 If the UE has indicated that it supports transfer of Port Management Information Containers as per UE 5GSM Core Network Capability, then the UE shall include the MAC address of the DS-TT Ethernet port used for this PDU session. If the UE is aware of the UE-DS-TT Residence Time, then the UE shall additionally include the UE-DS-TT Residence Time.

 If the UE requests to establish always-on PDU session, the UE includes an Always-on PDU Session Requested indication in the PDU Session Establishment Request message.

 Port Management Information Container is received from DS-TT and includes port management capabilities, i.e. information indicating which standardized and deployment-specific port management information is supported by DS-TT as defined in TS 23.501 [2] clause 5.28.3.

[…]

#### 4.3.2.2 UE Requested PDU Session Establishment

##### 4.3.2.2.1 Non-roaming and Roaming with Local Breakout

[…]

3. From AMF to SMF: Either Nsmf\_PDUSession\_CreateSMContext Request (SUPI, selected DNN, UE requested DNN, S-NSSAI(s), PDU Session ID, AMF ID, Request Type, PCF ID, Priority Access, [Small Data Rate Control Status], N1 SM container (PDU Session Establishment Request), User location information, Access Type, RAT Type, PEI, GPSI, UE presence in LADN service area, Subscription For PDU Session Status Notification, DNN Selection Mode, Trace Requirements, Control Plane CIoT 5GS Optimisation indication, or Control Plane Only indicator) or Nsmf\_PDUSession\_UpdateSMContext Request (SUPI, DNN, S-NSSAI(s), SM Context ID, AMF ID, Request Type, N1 SM container (PDU Session Establishment Request), User location information, Access Type, RAT type, PEI, Serving Network (PLMN ID, or PLMN ID and NID, see clause 5.18 of TS 23.501 [2])).

 If the AMF does not have an association with an SMF for the PDU Session ID provided by the UE (e.g. when Request Type indicates "initial request"), the AMF invokes the Nsmf\_PDUSession\_CreateSMContext Request, but if the AMF already has an association with an SMF for the PDU Session ID provided by the UE (e.g. when Request Type indicates "existing PDU Session"), the AMF invokes the Nsmf\_PDUSession\_UpdateSMContext Request.

 The AMF sends the S-NSSAI of the Serving PLMN from the Allowed NSSAI to the SMF. For roaming scenario in local breakout (LBO), the AMF also sends the corresponding S-NSSAI of the HPLMN from the Mapping Of Allowed NSSAI to the SMF.

 The AMF ID is the UE's GUAMI which uniquely identifies the AMF serving the UE. The AMF forwards the PDU Session ID together with the N1 SM container containing the PDU Session Establishment Request received from the UE. The GPSI shall be included if available at AMF.

 The AMF determines Access Type and RAT Type, see clause 4.2.2.2.1.

\*\*\* Begin of Change \*\*\*

If available, the AMF sends the satellite category to the SMF. The SMF may check the consistency of the DNN/S-NSSAI and the satellite category information provided by the AMF. Based on this check, the SMF may decide to reject the PDU Session Establishment request (e.g. due to the fact that the DNN/S-NSSAI is only used for some specific low latency service).

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

 The AMF provides the PEI instead of the SUPI when the UE in limited service state has registered for Emergency services (i.e. Emergency Registered) without providing a SUPI. The PEI is defined in TS 23.501 [2] clause 5.9.3. If the UE in limited service state has registered for Emergency services (i.e. Emergency Registered) with a SUPI but has not been authenticated the AMF indicates that the SUPI has not been authenticated. The SMF determines that the UE has not been authenticated when it does not receive a SUPI for the UE or when the AMF indicates that the SUPI has not been authenticated.

[…]

#### 4.3.2.2 UE Requested PDU Session Establishment

##### 4.3.2.2.1 Non-roaming and Roaming with Local Breakout

5. From SMF to AMF: Either Nsmf\_PDUSession\_CreateSMContext Response (Cause, SM Context ID or N1 SM container (PDU Session Reject (Cause))) or an Nsmf\_PDUSession\_UpdateSMContext Response depending on the request received in step 3.

 If the SMF received Nsmf\_PDUSession\_CreateSMContext Request in step 3 and the SMF is able to process the PDU Session establishment request, the SMF creates an SM context and responds to the AMF by providing an SM Context ID.

 If the UP Security Policy for the PDU Session is determined to have Integrity Protection set to "Required", the SMF may, based on local configuration, decide whether to accept or reject the PDU Session request based on the UE Integrity Protection Maximum Data Rate.

\*\*\* Begin of Change \*\*\*

Based on the decision described in step 3, the SMF may reject the PDU Session Establishment request.

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

NOTE 4: The SMF can e.g. be configured to reject a PDU Session if the UE Integrity Protection Maximum Data Rate has a very low value, if the services provided by the DN would require higher bitrates.

 When the SMF decides to not accept to establish a PDU Session, the SMF rejects the UE request via NAS SM signalling including a relevant SM rejection cause by responding to the AMF with Nsmf\_PDUSession\_CreateSMContext Response. The SMF also indicates to the AMF that the PDU Session ID is to be considered as released, the SMF proceeds to step 20 and the PDU Session Establishment procedure is stopped.

#### 4.3.2.2 UE Requested PDU Session Establishment

##### 4.3.2.2.1 Non-roaming and Roaming with Local Breakout

\*\*\* Begin of Change \*\*\*

7b. The SMF may perform an SM Policy Association Establishment procedure as defined in clause 4.16.4 to establish an SM Policy Association with the PCF and get the default PCC Rules for the PDU Session. The GPSI shall be included if available at SMF. If the Request Type in step 3 indicates "Existing PDU Session", the SMF may provide information on the Policy Control Request Trigger condition(s) that have been met by an SMF initiated SM Policy Association Modification procedure as defined in clause 4.16.5.1. The PCF may provide policy information defined in clause 5.2.5.4 (and in TS 23.503 [20]) to SMF.

 The PCF, based on the Emergency DNN, sets the ARP of the PCC rules to a value that is reserved for Emergency services as described in TS 23.503 [20].

If the SMF performs an SM Policy Association Establishment procedure, then the SMF may send the satellite category to the PCF. The satellite category shall be indicated in the new (optional) input Backhaul Type in the Npcf\_SMPolicyControl\_Create operation sent to the PCF. The PCF may take the satellite category information into account when generating the PCC rules (to be provided to the SMF) and may make other policy decisions, e.g. it may also request the SMF to reject the PDU Session Establishment request.NOTE 5: The purpose of step 7 is to receive PCC rules before selecting UPF. If PCC rules are not needed as input for UPF selection, step 7 can be performed after step 8.

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

#### 4.3.2.2 UE Requested PDU Session Establishment

##### 4.3.2.2.1 Non-roaming and Roaming with Local Breakout

\*\*\* Begin of Change \*\*\*

8. If the Request Type in step 3 indicates "Initial request", the SMF selects an SSC mode for the PDU Session as described in TS 23.501 [2] clause 5.6.9.3. The SMF also selects one or more UPFs as needed as described in TS 23.501 [2] clause 6.3.3. In the case of PDU Session Type IPv4 or IPv6 or IPv4v6, the SMF allocates an IP address/prefix for the PDU Session (unless configured otherwise) as described in TS 23.501 [2] clause 5.8.2. In the case of PDU Session Type IPv6 or IPv4v6, the SMF also allocates an interface identifier to the UE for the UE to build its link-local address. For Unstructured PDU Session Type the SMF may allocate an IPv6 prefix for the PDU Session and N6 point-to-point tunnelling (based on UDP/IPv6) as described in TS 23.501 [2] clause 5.6.10.3. For Ethernet PDU Session Type, neither a MAC nor an IP address is allocated by the SMF to the UE for this PDU Session.

 If PCC rules have been received or are available, then the SMF may take these rules and information on QoS limitations (if available) of the candidate UPFs into account as input for the UPF selection process.

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

 If the AMF indicated Control Plane CIoT 5GS Optimisation in step 3 for this PDU session, then,

1) For Unstructured PDU Session Type, the SMF checks whether UE's subscription include a "NEF Identity for NIDD" for the DNN/S-NSSAI combination. When the "NEF Identity for NIDD" is present in the UE's subscription data, the SMF will select the NEF identified for the S-NSSAI and selected DNN in the "NEF Identity for NIDD" as the anchor of this PDU Session. Otherwise, the SMF will select a UPF as the anchor of this PDU Session.

2) For other PDU Session Types, the SMF will perform UPF selection to select a UPF as the anchor of this PDU Session.

 If the Request Type in Step 3 is "Existing PDU Session", the SMF maintains the same IP address/prefix that has already been allocated to the UE in the source network.

 If the Request Type in step 3 indicates "Existing PDU Session" referring to an existing PDU Session moved between 3GPP access and non-3GPP access the SMF maintains the SSC mode of the PDU Session, the current PDU Session Anchor and IP address.

NOTE 6: The SMF may decide to trigger e.g. new intermediate UPF insertion or allocation of a new UPF as described in step 5 in clause 4.2.3.2.

 If the Request Type indicates "Emergency Request", the SMF selects the UPF as described in TS 23.501 [2] clause 5.16.4 and selects SSC mode 1.

 SMF may select a UPF (e.g. based on requested DNN/S-NSSAI) that supports NW-TT functionality.

#### 4.3.2.2 UE Requested PDU Session Establishment

##### 4.3.2.2.1 Non-roaming and Roaming with Local Breakout

9. SMF may perform an SMF initiated SM Policy Association Modification procedure as defined in clause 4.16.5.1 to provide information on the Policy Control Request Trigger condition(s) that have been met. If Request Type is "initial request" and dynamic PCC is deployed and PDU Session Type is IPv4 or IPv6 or IPv4v6, SMF notifies the PCF (if the Policy Control Request Trigger condition is met) with the allocated UE IP address/prefix(es).

 When PCF is deployed, the SMF shall further report the PS Data Off status to PCF if the PS Data Off Policy Control Request Trigger is provisioned, the additional behaviour of SMF and PCF for 3GPP PS Data Off is defined in TS 23.503 [20].

NOTE 7: If an IP address/prefix has been allocated before step 7 (e.g. subscribed static IP address/prefix in UDM/UDR) or the step 7 is perform after step 8, the IP address/prefix can be provided to PCF in step 7, and the IP address/prefix notification in this step can be skipped.

\*\*\* Begin of Change \*\*\*

 PCF may provide updated policies to the SMF. The PCF may provide policy information defined in clause 5.2.5.4 (and in TS 23.503 [20]) to SMF.

Based on the QoS limitations of the selected UPF(s), if the SMF determines it cannot comply to the PCC rules received from the PCF, the SMF may initiate an SM Policy Association Modification procedure to notify the PCF of the QoS limitation according to a Policy Control Request Trigger. The Policy Control Request Trigger shall indicate 'Requested PDB cannot be fulfilled'. The PCF may make policy decision based on the QoS limitation and provides updated policies to the SMF. The PCF policy decision can be either i) provide PCC Rules with updated 5QI with changed 5G QoS characteristics PDB if the Application can adjust to different QoS profiles, or ii) remove the PCC Rules if the Application cannot adjust to different QoS profile, the removal of PCC Rules may lead to termination of the PDU session in the SMF. The mapping of possible QoS profiles suitable for an Application is defined in the PCF using operator defined policies.

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

#### 4.3.2.2 UE Requested PDU Session Establishment

##### 4.3.2.2.1 Non-roaming and Roaming with Local Breakout

11. SMF to AMF: Namf\_Communication\_N1N2MessageTransfer (PDU Session ID, N2 SM information (PDU Session ID, QFI(s), QoS Profile(s), CN Tunnel Info, S-NSSAI from the Allowed NSSAI, Session-AMBR, PDU Session Type, User Plane Security Enforcement information, UE Integrity Protection Maximum Data Rate, RSN), N1 SM container (PDU Session Establishment Accept ([QoS Rule(s) and QoS Flow level QoS parameters if needed for the QoS Flow(s) associated with the QoS rule(s)], selected SSC mode, S-NSSAI(s), UE Requested DNN, allocated IPv4 address, interface identifier, Session-AMBR, selected PDU Session Type, [Reflective QoS Timer] (if available), [P-CSCF address(es)], [Control Plane Only indicator], [Header Compression Configuration], [Always-on PDU Session Granted], [Small Data Rate Control parameters], [Small Data Rate Control Status], [Serving PLMN Rate Control]))). If multiple UPFs are used for the PDU Session, the CN Tunnel Info contains tunnel information related with the UPFs that terminate N3.

 The SMF may provide the SMF derived CN assisted RAN parameters tuning to the AMF by invoking Nsmf\_PDUSession\_SMContextStatusNotify (SMF derived CN assisted RAN parameters tuning) service. The AMF stores the SMF derived CN assisted RAN parameters tuning in the associated PDU Session context for this UE.

 The N2 SM information carries information that the AMF shall forward to the (R)AN which includes:

- The CN Tunnel Info corresponds to the Core Network address(es) of the N3 tunnel corresponding to the PDU Session. If two CN Tunnel Info are included for the PDU session for redundant transmission, the SMF also indicates the NG-RAN that one of the CN Tunnel Info used as the redundancy tunnel of the PDU session as described in clause 5.33.2.2 of TS 23.501 [2].

- One or multiple QoS profiles and the corresponding QFIs can be provided to the (R)AN. This is further described in TS 23.501 [2] clause 5.7. The SMF may indicate for each QoS Flow whether redundant transmission shall be performed by a corresponding redundant transmission indicator.

- The PDU Session ID may be used by AN signalling with the UE to indicate to the UE the association between (R)AN resources and a PDU Session for the UE.

- A PDU Session is associated to an S-NSSAI of the HPLMN and, if applicable, to a S-NSSAI of the VPLMN, and a DNN. The S-NSSAI provided to the (R)AN, is the S-NSSAI with the value for the Serving PLMN (i.e. the HPLMN S-NSSAI or, in LBO roaming case, the VPLMN S-NSSAI).

- User Plane Security Enforcement information is determined by the SMF 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 as received in the PDU Session Establishment Request.

- The use of the RSN parameter by NG-RAN is described in TS 23.501 [2] clause 5.33.2.1.

 The N1 SM container contains the PDU Session Establishment Accept that the AMF shall provide to the UE. If the UE requested P-CSCF discovery then the message shall also include the P-CSCF IP address(es) as determined by the SMF and as described in TS 23.501 [2] clause 5.16.3.4. The PDU Session Establishment Accept includes S-NSSAI from the Allowed NSSAI. For LBO roaming scenario, the PDU Session Establishment Accept includes the S-NSSAI from the Allowed NSSAI for the VPLMN and also it includes the corresponding S-NSSAI of the HPLMN from the Mapping Of Allowed NSSAI that SMF received in step 3.

 If the PDU Session being established was requested to be an always-on PDU Session, the SMF shall indicate whether the request is accepted by including an Always-on PDU Session Granted indication in the PDU Session Establishment Accept message. If the PDU Session being established was not requested to be an always-on PDU Session but the SMF determines that the PDU Session needs to be established as an always-on PDU Session, the SMF shall include an Always-on PDU Session Granted indication in the PDU Session Establishment Accept message indicating that the PDU session is an always-on PDU Session.

 If Control Plane CIoT 5GS Optimisation is enabled for this PDU session, the N2 SM information is not included in this step. If Control Plane CIoT 5GS optimisation is enabled for this PDU session, and the UE has sent the Header Compression Configuration in the PDU Session Establishment Request, and the SMF supports the header compression parameters, the SMF shall include the Header Compression Configuration in the PDU Session Establishment Accept message. If the UE has included Header Compression Configuration in the PDU Session Establishment Request, the SMF may acknowledge Header Compression setup parameters. If the SMF has received the Control Plane Only Indicator in step 3, the SMF shall include the Control Plane Only Indicator in the PDU Session Establishment Accept message. The SMF shall indicate the use of Control Plane only on its CDR. If the Small Data Rate Control is configured in the SMF, the SMF shall also include Small Data Rate Control parameters and the Small Data Rate Control Status (if received from the AMF) in the PDU Session Establishment Accept message as described in clause 5.31.14.3 of TS 23.501 [2]. If the Serving PLMN intends to enforce Serving PLMN Rate Control (see clause 5.31.14.2 of TS 23.501 [2]) for this PDU session then the SMF shall include the Serving PLMN Rate Control parameters in the PDU Session Establishment Accept message. The UE shall store and use Serving PLMN Rate Control parameters as the maximum allowed limit of uplink control plane user data.

 If the UE indicates the support of RDS in the PCO in the PDU Session Establishment Request and RDS is enabled for the PDU Session, the SMF shall inform the UE that RDS is enabled in the PCO in the PDU Session Establishment Accept (see clause 5.31.6 of TS 23.501 [2]).

 If the NIDD parameters (e.g., maximum packet size) were received from NEF during the SMF-NEF Connection Establishment procedure in step 10, the SMF shall inform the UE of the NIDD parameters in the PCO in the PDU Session Establishment Accept (see clause 5.31.5 of TS 23.501 [2]).

 Multiple QoS Rules, QoS Flow level QoS parameters if needed for the QoS Flow(s) associated with those QoS rule(s) and QoS Profiles may be included in the PDU Session Establishment Accept within the N1 SM and in the N2 SM information.

\*\*\* Begin of Change \*\*\*

 The Namf\_Communication\_N1N2MessageTransfer contains the PDU Session ID allowing the AMF to know which access towards the UE to use.

The SMF generates QoS parameters based on the PCC rules. The SMF provides the QoS parameters to the AN node and the UE.

 If the PDU session establishment failed anywhere between step 5 and step 11, then the Namf\_Communication\_N1N2MessageTransfer request shall include the N1 SM container with a PDU Session Establishment Reject message (see clause 8.3.3 of TS 24.501 [25]) and shall not include any N2 SM container. The (R)AN sends the NAS message containing the PDU Session Establishment Reject to the UE. In this case, steps 12-17 are skipped.

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

### 4.16.4 SM Policy Association Establishment



Figure 4.16.4-1: SM Policy Association Establishment

This procedure concerns both roaming and non-roaming scenarios.

In the non-roaming case the V-PCF is not involved. In the local breakout roaming case, the H-PCF is not involved. In the home routed roaming case, the V-PCF is not involved and the H-PCF interacts with the H-SMF.

This procedure is used in UE requests a PDU Session Establishment as explained in clause 4.3.2.2.1, for non-roaming and local breakout roaming. For home-routed roaming, as explained in clause 4.3.2.2.2.

For local breakout roaming, the interaction with HPLMN (e.g. step 3) is not used. In local breakout roaming, the V-PCF interacts with the UDR of the VPLMN.

1. The SMF determines that the PCC authorization is required and requests to establish an SM Policy Association with the PCF by invoking Npcf\_SMPolicyControl\_Create operation (see clause 5.2.5.4.2). The SMF includes the following information: SUPI, PDU Session id, PDU Session Type, S-NSSAI, NSI ID (if available), DNN, DNN Selection Mode, GPSI (if available), Access Type, RAT Type, AMF instance identifier and if available, the IPv4 address and/or IPv6 network prefix, PEI, User Location Information, UE Time Zone, Serving Network (PLMN ID, or PLMN ID and NID, see clause 5.34 of TS 23.501 [2]), Charging Characteristics, Session AMBR, default QoS information, Trace Requirements, Internal Group Identifier (see TS 23.501 [2], clause 5.9.7).

 The SMF provides Trace Requirements to the PCF when it has received Trace Requirements and it has selected a different PCF than the one received from the AMF.

 If the DNN Selection Mode indicates that the DNN is not explicitly subscribed, the PCF may use the local configuration instead of PDU Session policy control data in UDR.

2. If the PCF does not have the subscriber's subscription related information, it sends a request to the UDR by invoking Nudr\_DM\_Query (SUPI, DNN, S-NSSAI, Policy Data, PDU Session policy control data, Remaining allowed Usage data) service in order to receive the information related to the PDU Session. The PCF may request notifications from the UDR on changes in the subscription information by invoking Nudr\_DM\_Subscribe (Policy Data, SUPI, DNN, S-NSSAI, Notification Target Address (+ Notification Correlation Id), Event Reporting Information (continuous reporting), PDU Session policy control data, Remaining allowed Usage data) service.

3. If the PCF determines that the policy decision depends on the status of the policy counters available at the CHF and such reporting is not established for the subscriber, the PCF initiates an Initial Spending Limit Report Retrieval as defined in clause 4.16.8.2. If policy counter status reporting is already established for the subscriber, and the PCF determines that the status of additional policy counters are required, the PCF initiates an Intermediate Spending Limit Report Retrieval as defined in clause 4.16.8.3.

4. The PCF makes the authorization and the policy decision. The PCF may reject Npcf\_SMPolicyControl\_Create request when Validation condition is not satisfied. (see TS 23.503 [20], clause 6.1.2.4).

 PCF may invoke Nbsf\_Management\_Register service operation to create the binding information in BSF.

\*\*\* Begin of Change \*\*\*

5. The PCF answers with a Npcf\_SMPolicyControl\_Create response; in its response the PCF may provide policy information defined in clause 5.2.5.4 (and in TS 23.503 [20]). The SMF enforces the decision. For RAT Types related with satellite access, 5QI values that require low latency should not be considered in this response. The SMF implicitly subscribes to changes in the policy decisions.

NOTE: After this step the PCF can subscribe to SMF events associated with the PDU Session.

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