**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:*** | Impact of NR(LEO), NR(MEO, NR(GEO) and NR(OTHERSAT) on 5GS procedures | | | | | | | | | |
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| ***Source to WG:*** | TNO | | | | | | | | | |
| ***Source to TSG:*** | SA2 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | 5GSAT\_ARCH | | | | |  | ***Date:*** | | | 2020-07-16 |
|  |  | | | |  | |  | | |  |
| ***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-12 (Release 12) Rel-13 (Release 13) Rel-14 (Release 14) Rel-15 (Release 15) Rel-16 (Release 16)* | |
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| ***Reason for change:*** | | NR(LEO), NR(MEO), NR(GEO) and NR(OTHERSAT) are new RAT Types introduced in order to make 5G CN aware of NR satellite access and corresponding QoS limitations e.g. latency (Packet Delay Budget).  Satellite related new RAT type code points impact the following functions:  - AMF determines this new RAT type from the Global RAN Node ID during N2 setup and uses it in any procedures where RAT type is applied.  - SMF uses this new RAT type code point to restrict certain 5QI values.  - PCF uses this new RAT type code point to restrict certain 5QI values.  - Charging uses this new RAT Type code point for satellite specific charging.  - LCS uses this new RAT Type code point for satellite specific location procedures. | | | | | | | | |
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| ***Summary of change:*** | | Adaptation of procedures/functions that account for new RAT Types are proposed in this CR in order to account for possible QoS limitations related to access over satellite. | | | | | | | | |
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| ***Consequences if not approved:*** | | Inability of 5GS to recognize QoS limitations (e.g. latency) related to satellite access and to act accordingly on these limitations. | | | | | | | | |
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| ***Clauses affected:*** | | 7.10 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | | **X** |  | Other core specifications | | | | 29.571, 23.501 | | |
| ***affected:*** | |  | **X** | Test specifications | | | |  | | |
| ***(show related CRs)*** | |  | **X** | O&M Specifications | | | |  | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

#### 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.

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

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.

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). The AMF determines RAT Type based on the gNB ID part of the Global RAN Node ID and possibly TA associated with the N2 interface. For example, a separate Global RAN Node ID value range can be used for Satellite NR nodes to distinguish them from terrestrial NR nodes.

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.

\*\*\* 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 \*\*\*

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 PCF is not deployed the SMF will according to local policy determine a QoS profile and 5QI value for this PDU session and communicate this in step 11. For RAT Types related with satellite access, 5QI values that require low latency should not be considered in this response.

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 \*\*\*

### 4.16.4 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 \*\*\*