**SA WG2 Meeting #141ES2-2007070 r01**

**October 12 – 23, 2020, Elbonia (revision of S2-200xxxx)**

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| *CR-Form-v12.0* |
| **CHANGE REQUEST** |
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|  | **23.502**  | **CR** | **2469** | **rev** | **-** | **Current version:** | **16.6.0** |  |
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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:***  | QoS parameter handling for PDU session transfer between 3GPP and non-3GPP access |
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| ***Source to WG:*** | Apple, Nokia, Nokia Shanghai Bell |
| ***Source to TSG:*** | S2 |
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| ***Work item code:*** | 5GS\_Ph1; TEI16 |  | ***Date:*** | 2020-09-30 |
|  |  |  |  |  |
| ***Category:*** | **F** |  | ***Release:*** | Rel-16 |
|  | *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)* |
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| ***Reason for change:*** | There is some ambiguity in TS 23.502 regarding the handling of the QoS parameters (QoS rules, QoS Flow level QoS parameters, QoS profiles) for the case of PDU session transfer between 3GPP and non-3GPP access:Currently, it is not specified explicitly, whether the SMF includes in the PDU Session Establishment Accept message:i) the complete set of QoS rules and QoS Flow level QoS parameters applicable to the PDU session for the target access; orii) only the QoS rule operations and QoS Flow level QoS parameters operations describing the difference to the QoS parameters used for the source access.It is proposed to apply i), i.e. send the complete set of QoS rules and QoS Flow level QoS parameters, as this is in line with other use cases where the UE sends a PDU Session Establishment Request with request type = "existing PDU session" (e.g. PDU session transfer from EPS without N26 interface). |
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| ***Summary of change:*** | The SMF shall include all QoS Rules, QoS Flow level QoS parameters and QoS Profiles that are applicable to the PDU session for the target access. |
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| ***Consequences if not approved:*** | Ambiguous specification can result in the following interoperability issues: If the SMF includes a complete set of QoS rules, but the UE expects to receive only the difference to the QoS parameters used before the PDU session transfer, then this will trigger error handling in the UE and will result in the release of the PDU session. On the other hand, if the SMF includes only the difference to the QoS parameters used before the PDU session transfer, but the UE expects to receive the complete set of QoS rules, this will result in a wrong mapping of UL user data packets to QoS flows. So QoS will not work as intended. |
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| ***Clauses affected:*** | 4.9.2.1, 4.9.2.2, 4.9.2.3.1, 4.9.2.3.2, 4.9.2.4.1, 4.9.2.4.2 |
|  |  |
|  | **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:*** |  |

\*\*\*\*\* First change \*\*\*\*\*

#### 4.9.2.1 Handover of a PDU Session procedure from untrusted non-3GPP to 3GPP access (non-roaming and roaming with local breakout)

Clause 4.9.2.1 specifies how to hand over a UE from a source Untrusted non-3GPP access to a target 3GPP access and how a UE can handover a PDU Session from untrusted non-3GPP access to 3GPP access. It is based on the PDU Session Establishment procedure for 3GPP access as specified in clause 4.3.2.



Figure 4.9.2.1-1: Handover of a PDU Session procedure from untrusted non-3GPP access to 3GPP access (non-roaming and roaming with local breakout)

1. If the UE is not registered via 3GPP access, the UE shall initiate Registration procedure as defined in clause 4.2.2.2.2.

2. The UE performs a PDU Session Establishment procedure with the PDU Session ID of the PDU Session to be moved as specified clause 4.3.2.2.1 (PDU Session Establishment for Non-roaming and Roaming with Local Breakout).

 When sending the PDU Session Establishment Accept, within the N1 SM and in the N2 SM information, the SMF shall include all QoS information (e.g. QoS Rules in N1 SM information, QoS Profiles in N2 SM information) for the QoS Flow(s) that are applicable to the PDU session for the target access.

3. If the User Plane of the PDU Session is activated in non-3GPP access, the V-SMF executes the release of resources in non-3GPP access by performing steps 4 to 7 specified in clause 4.12.7, followed by step 7a specified in clause 4.3.4.2 in order to release the resources over the source non-3GPP access. Because the PDU Session shall not be released, the SMF shall not send the PDU Session Release Command to the UE. Hence, in steps 4 and 7 of clause 4.12.7 as well as in step 7a of clause 4.3.4.2, the messages do not include the N1 SM container but only the N2 Resource Release Request (resp. Ack). Since the PDU Session is not to be released, the SMF shall not execute step 7b of clause 4.3.4.2 and the SM context between the AMF and the SMF is maintained.

 If the User Plane of the PDU Session is deactivated in non-3GPP access, this step is skipped.

The steps 2 and 3 shall be repeated for all PDU Sessions to be moved from to untrusted non-3GPP access to 3GPP access.

If the UE is moving to the NB-IoT RAT type of 3GPP access, the PDU Session Establishment request would be rejected by AMF when the UP resources exceeds the UE's maximum number of supported UP resources as described in clause 5.4.5.2.4 of TS 24.501 [25].

#### 4.9.2.2 Handover of a PDU Session procedure from 3GPP to untrusted non-3GPP access (non-roaming and roaming with local breakout)

Clause 4.9.2.2 specifies how to hand over a UE from a source 3GPP access to a target Untrusted non-3GPP access and how a UE can handover a PDU Session from 3GPP access to untrusted non-3GPP access. It is based on the PDU Session Establishment procedure for non-3GPP access as specified in clause 4.12.5.



Figure 4.9.2.2-1: Handover of a PDU Session from 3GPP access to untrusted non-3GPP access (non-roaming and roaming with local breakout)

1. If the UE is not registered via untrusted non-3GPP access, the UE shall initiate Registration procedure as defined in clause 4.12.2.

2. The UE performs PDU Session Establishment procedure with the PDU Session ID of the PDU Session to be moved as specified in clause 4.12.5.

 In the PDU Session Establishment Accept within the N1 SM and in the N2 SM information, the SMF shall include all QoS Rules, QoS Flow level QoS parameters if needed for the QoS Flow(s) associated with those QoS rule(s) and QoS Profiles that are applicable to the PDU session for the target access.

3. If the User Plane of the PDU Session is activated in 3GPP access, the V-SMF executes the release of resource in 3GPP by performing step 3b, then steps 4 to 7a specified in clause 4.3.4.2 (UE or network requested PDU Session Release for Non-Roaming and Roaming with Local Breakout) in order to release the resources over the source 3GPP access. Because the PDU Session shall not be released, the SMF shall not send the PDU Session Release Command to the UE. Hence, in steps 3b, 4, 6 and 7a of clause 4.3.4.2, messages do not include the N1 SM container but only the N2 Resource Release Request (resp. Ack). Since the PDU Session is not to be released, the SMF shall not execute step 7b of clause 4.3.4.2 and the SM context between the AMF and the SMF is maintained.

 If the User Plane of the PDU Session is deactivated in 3GPP access, this step is skipped.

The steps 2 and 3 shall be repeated for all PDU Sessions to be moved from 3GPP access to untrusted non-3GPP access.

If the PDU Session is associated with Control Plane Only Indication, the AMF shall reject the PDU Session establishment request as the Control Plane CIoT Optimisation feature is not supported over non-3GPP accesses as described in clause 5.4.5.2.5 of TS 24.501 [25].

#### 4.9.2.3 Handover of a PDU Session procedure from untrusted non-3GPP to 3GPP access (home routed roaming)

##### 4.9.2.3.1 The target AMF is in the PLMN of the N3IWF



Figure 4.9.2.3.1 -1: Handover of a PDU Session procedure from untrusted non-3GPP access to 3GPP access (home routed roaming)

1. If the UE is not registered via 3GPP access, the UE shall initiate Registration procedure as defined in clause 4.2.2.2.2. The NG-RAN selects the same AMF as the one used via non-3GPP access.

2. The UE performs a PDU Session Establishment procedure with the PDU Session ID of the PDU Session to be moved as specified clause 4.3.2.2.2 (PDU Session Establishment for Home Routed Roaming). The AMF selects the same V-SMF as the one used via non-3GPP access.

 In the Nsmf\_PDUSession\_Create Response the H-SMF shall include all QoS information for the QoS Flow(s) applicable to the PDU session for the target access so that when sending the PDU Session Establishment Accept, within the N1 SM and in the N2 SM information, the V-SMF can include all QoS information (e.g. QoS Rules in N1 SM information, QoS Profile in N2 SM information) for the QoS Flow(s) acceptable according to VPLMN policies.

3. If the User Plane of the PDU Session is activated in non-3GPP access, the V-SMF executes the release of resource in non-3GPP access by performing steps 4 to 7 specified in clause 4.12.7, followed by step 7 specified in clause 4.3.4.2 in order to release the resources over the source non-3GPP access. Because the PDU Session shall not be released, the SMF shall not send the PDU Session Release Command to the UE. Hence, in steps 4 and 7 of clause 4.12.7 as well as in step 7a of clause 4.3.4.2, the messages do not include the N1 SM container but only the N2 Resource Release Request (resp. Ack). Since the PDU Session is not to be released, the SMF shall not execute step 7b of clause 4.3.4.2 and the SM context between the AMF and the SMF is maintained.

 If the User Plane of the PDU Session is deactivated in non-3GPP access, this step is skipped.

The steps 2 and 3 shall be repeated for all PDU Sessions to be moved from to untrusted non-3GPP access to 3GPP access.

##### 4.9.2.3.2 The target AMF is not in the PLMN of the N3IWF (i.e. N3IWF in HPLMN)



Figure 4.9.2.3.2-1: Handover of a PDU Session procedure from untrusted non-3GPP access with N3IWF in the HPLMN to 3GPP access (home routed roaming)

1. If the UE is not registered via 3GPP access, the UE shall initiate Registration procedure as defined in clause 4.2.2.2.2. This includes the retrieval of the SMF-IDs corresponding to each of the PDU Sessions.

2. The UE performs a PDU Session Establishment procedure with the PDU Session ID of the PDU Session to be moved as specified clause 4.3.2.2.2 (PDU Session Establishment for Home Routed Roaming).

 In the PDU Session Establishment Accept within the N1 SM and in the N2 SM information, the H-SMF shall include all QoS Rules, QoS Flow level QoS parameters if needed for the QoS Flow(s) associated with those QoS rule(s) and QoS Profiles that are applicable to the PDU session for the target access.

3. The H-SMF executes the release of resources in non-3GPP AN by performing steps 3-12 specified in clause 4.12.7 with the following exceptions:

- the H-SMF interfaces the source AMF (in the home PLMN). The H-SMF shall not send the N1 SM Container (PDU Session Release Command) to the UE;

- The Npcf\_SMPolicyControl\_Delete service operation to PCF shall not be performed.

- Nsmf\_PDUSession\_SMContexStatusNotify service operation invoked by the H-SMF to the source AMF indicates the PDU Session is moved to different access.

The steps 2 and 3 shall be repeated for all PDU Sessions to be moved from to untrusted non-3GPP access to 3GPP access.

#### 4.9.2.4 Handover of a PDU Session procedure from 3GPP to untrusted non-3GPP access (home routed roaming)

##### 4.9.2.4.1 The selected N3IWF is in the registered PLMN



Figure 4.9.2.4.1-1: Handover of a PDU Session procedure from 3GPP access to untrusted non-3GPP access (home routed roaming)

1. If the UE is not registered via untrusted non-3GPP access, the UE shall initiate Registration procedure as defined in clause 4.12.2. The N3IWF selects the same AMF as the one used via 3GPP access.

2. The UE performs PDU Session Establishment procedure with the PDU Session ID of the PDU Session to be moved as specified in clause 4.12.5. The AMF selects the same V-SMF as the one used via 3GPP access.

 In the PDU Session Establishment Accept within the N1 SM and in the N2 SM information, the H-SMF shall include all QoS Rules, QoS Flow level QoS parameters if needed for the QoS Flow(s) associated with those QoS rule(s) and QoS Profiles that are applicable to the PDU session for the target access.

3. If the User Plane of the PDU Session is activated in 3GPP access, the V-SMF executes the release of resources in 3GPP access by performing step 5c to 10 specified in clause 4.3.4.3 (UE or network requested PDU Session Release for Home Routed Roaming) in order to release the resources over the source 3GPP access. Because the PDU Session shall not be released, the SMF shall not send the PDU Session Release Command to the UE. Hence, in steps 5c, 6, 8 and 9 of clause 4.3.4.3, the messages do not include the N1 SM container but only the N2 Resource Release Request (resp. Ack). Since the PDU Session is not to be released, the SMF shall not execute step 7b of clause 4.3.4.2 and the SM context between the AMF and the SMF is maintained.

 If the User Plane of the PDU Session is deactivated in 3GPP access, this step is skipped.

The steps 2 and 3 shall be repeated for all PDU Sessions to be moved from 3GPP access to untrusted non-3GPP access.

##### 4.9.2.4.2 The UE is roaming and the selected N3IWF is in the home PLMN



Figure 4.9.2.4.2-1: Handover of a PDU Session procedure from 3GPP access to untrusted non-3GPP access with N3IWF in the HPLMN (home routed roaming)

1. If the UE is not registered via untrusted non-3GPP access, the UE shall initiate Registration procedure as defined in clause 4.12.2. This includes the retrieval of the SMF-IDs corresponding to each of the PDU Sessions.

2. The UE performs PDU Session Establishment procedure with the PDU Session ID of the PDU Session to be moved as specified in clause 4.12.5.

 In the PDU Session Establishment Accept within the N1 SM and in the N2 SM information, the H-SMF shall include all QoS Rules, QoS Flow level QoS parameters if needed for the QoS Flow(s) associated with those QoS rule(s) and QoS Profiles that are applicable to the PDU session for the target access.

3. The H-SMF executes the release of resources in source V-SMF, V-UPF, V-AMF and 3GPP AN by performing steps 3a, 5c to 16b specified in clause 4.3.4.3 with the following exceptions:

- the H-SMF indicates in the Nsmf\_PDUSession\_Update Request that the UE shall not be notified. This shall result in the V-SMF not sending the N1 Container (PDU Session Release Command) to the UE;

- Nsmf\_PDUSession\_StatusNotify service operation invoked by H-SMF to V-SMF indicates PDU Session is moved to different access;

- Nsmf\_PDUSession\_SMContexStatusNotify service operation invoked by the V-SMF to the AMF indicates the PDU Session is moved to different access;

- The Npcf\_SMPolicyControl\_Delete service operation to PCF shall not be performed.

The steps 2 and 3 shall be repeated for all PDU Sessions to be moved from 3GPP access to untrusted non-3GPP access.