**3GPP TSG-WG SA2 Meeting #169S2-250xxxx**

**Fukuoka City, Fukuoka, JP, 19th May – 23rd May, 2025 (revision of S2-250xxxx)**

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| *CR-Form-v12.3* |
| **CHANGE REQUEST** |
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|  | **23.502** | **CR** | **XXXX** | **rev** | **X** | **Current version:** | **19.3.0** |  |
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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 |  | Radio Access Network |  | Core Network | **X** |

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| ***Title:***  | Clarification on MPQUIC-E functionality in roaming and EPS scenarios |
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| ***Source to WG:*** | Huawei, HiSilicon |
| ***Source to TSG:*** | SA2 |
|  |  |
| ***Work item code:*** | MASSS |  | ***Date:*** | 2025-05-08 |
|  |  |  |  |  |
| ***Category:*** | **F** |  | ***Release:*** | Rel-19 |
|  | *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-17 (Release 17)Rel-18 (Release 18)Rel-19 (Release 19) Rel-20 (Release 20)* |
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| ***Reason for change:*** | LS from CT4 (C4-250554) has mentioned whether and how the MQPUIC-E is applied to Home-routed MA PDU session and the MA PDU session which is established over 3GPP access in EPC. According to the technical analysis, for EPC scenario, if PGW-C+SMF also signal the IP type to eNB via MME, there will be impact on MME and SGW which will break the principle that the support for ATSSS is transparent to MME and SGW. For Home-Routed scenario, if the MPQUIC-E is enabled, issues will be introduced when UE move between EPS and 5GS since for EPS, MQPUIC-E is not enabled. Therefore, considering the complexity and potential impacts, home-routed scenario is also not supported as well.Therefore, further clarification is added.In roaming scenarios and over 3GPP access in EPS scenarios, only ATSSS-LL functionality is enabled when the type of the MA PDU Session is Ethernet. |
| ***op*** |  |
| ***Summary of change:*** | 1. The ATSSS capability of the MA PDU session that the H-SMF sends to the PCF based on PDU session type of Ethernet includes only the ATSSS-LL functionality, regardless of whether the UE and DNN support or allow the MPQUIC-E functionality.

The ATSSS capability of the MA PDU session that the PGW-C+SMF sends to PCF based on PDN type of Ethernet includes only the ATSSS-LL functionality, regardless of whether the UE support the MPQUIC-E functionality. |
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| ***Consequences if not approved:*** | Unspecified Network behaviour for MPQUIC-E in Home-routed MA PDU session and the MA PDU session which is established over 3GPP access in EPC. |
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| ***Clauses affected:*** | 4.22.2.2.1, 4.22.2.2.2, 4.22.2.3.2 |
|  |  |
|  | **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 ...  |
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| ***Other comments:*** |  |
|  |  |
| ***This CR's revision history:*** |  |

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

##### 4.22.2.2.1 Home-routed Roaming - UE registered to the same PLMN

When the UE is registered to the same VPLMN over 3GPP access and non-3GPP access, the MA PDU Session is established as specified in Figure 4.3.2.2.2-1 ("UE-requested PDU Session Establishment for home-routed roaming scenarios") with the differences and clarifications:

- The PDU Session Establishment Request message may be sent over the 3GPP access or over the non-3GPP access.

- In step 1, the UE provides Request Type as "MA PDU Request" in UL NAS Transport message and its ATSSS Capabilities, as defined in clause 5.32.2 of TS 23.501 [2] in PDU Session Establishment Request message. The UE indicates to AMF whether it supports non-3GPP access path switching.

- In step 2, if the AMF supports MA PDU sessions, then the AMF selects a V-SMF and an H-SMF, which supports MA PDU sessions. The V-SMF serves the UE over both accesses. If the AMF supports non-3GPP access path switching and the UE indicated in step 1 that the UE supports non-3GPP access path switching, the AMF selects a V-SMF and H-SMF supporting non-3GPP access path switching, if such a V-SMF and H-SMF are available.

- In step 3, the AMF informs the SMF that the request is for a MA PDU Session by including an "MA PDU Request" indication and in addition, the AMF indicates to V-SMF that the UE is registered over both accesses. If the AMF supports non-3GPP access path switching while maintaining two N2 connections for non-3GPP access, the selected SMFs supports non-3GPP path switching and UE indicated in step 1 that the UE supports non-3GPP access path switching, the AMF indicates whether the UE supports non-3GPP path switching to the V-SMF.

- In step 5, two DL N9 tunnel CN info and two UL N3 tunnel CN info are allocated by the V-SMF or by the V-UPF.

- In step 6, the V-SMF informs the H-SMF that the request is for a MA PDU Session by including an "MA PDU Request" indication and indicates to H-SMF that the UE is registered over both accesses. The V-SMF indicates to H-SMF the relationship between the DL N9 tunnel CN info and the access type. If the single CN Tunnel is established by the H-SMF, the DL N9 tunnel info binding to the access over which the NAS message is received is to be used.

- In step 7, the H-SMF retrieves, via Session Management subscription data, the information whether the MA PDU session is allowed or not.

- In step 9, if dynamic PCC is to be used for the MA PDU Session, the H-SMF sends an "MA PDU Request" indication to H-PCF in the SM Policy Control Create message and the ATSSS Capabilities of the MA PDU session. The ATSSS capability of the MA PDU session that the H-SMF sends to the H-PCF based on PDU session type of Ethernet includes only the ATSSS-LL functionality, regardless of whether UE and DNN configuration both support/allow MPQUIC-E functionality. The H-SMF provides the currently used list of Access Type(s) and RAT Type(s) for the MA-PDU session to the H-PCF. The H-PCF decides whether the MA PDU session is allowed or not based on operator policy and subscription data.

 The H-PCF provides the PCC rules containing MA PDU session control information and the H-SMF derives the ATSSS rules for the UE and the N4 rules for the H-UPF.

- In step 12, two UL N9 tunnel CN info are allocated by the H-SMF or by the H-UPF. After this step, the two N9 tunnels between the H-UPF and V-UPF are established.

- In step 13, the H-SMF sends "MA PDU session Accepted" indication to V-SMF in the Nsmf\_PDUSession\_Create Response message. The H-SMF indicates to V-SMF the relationship between the UL N9 tunnel CN info and the access type.

- In step 14, the V-SMF sends the "MA PDU session Accepted" indication in the Namf\_Communication\_N1N2MessageTransfer message to the AMF and indicates the AMF to send the N2 SM Information included in this message over the access that the UE sent the PDU Session Establishment Request. The AMF marks this PDU session as MA PDU session based on the received "MA PDU session Accepted" indication.

 The V-SMF indicates support of non-3GPP path switching in the PDU Session Establishment Accept message.

 If the V-SMF received two UL N9 tunnel CN info from the H-SMF, the V-SMF also initiates the establishment of user-plane resources over the other access. The V-SMF sends an N1N2 Message Transfer to AMF including N2 SM Information and the other access type to indicate to AMF that the N2 SM Information should be sent over the other access. The N1N2 Message Transfer does not include an N1 SM Container for the UE which was sent to UE over the access that the UE sent the PDU Session Establishment Request.

- In step 16, the UE receives a PDU Session Establishment Accept message, which indicates to UE that the requested MA PDU session was successfully established. This message includes the ATSSS rules for the MA PDU session, which were derived by H-SMF and may include Measurement Assistance Information.

- After step 20, if the V-SMF was informed in step 3 that the UE is registered over both accesses, then the V-SMF initiates the establishment of user-plane resources over the other access too. The V-SMF sends an N1N2 Message Transfer to the AMF including N2 SM Information and indicates to the AMF over which access the N2 SM Information should be sent. The N1N2 Message Transfer does not include an N1 SM Container for the UE because this was sent to the UE in step 14. After this step, two N9 tunnels between the H-UPF and the V-UPF as well as two N3 tunnels between the V-UPF and RAN/AN are established, or, if the H-UPF is connected to two different V-UPFs, the H-UPF has one N9 tunnel with each V-UPF.

\* \* \* \* Second change \* \* \* \*

##### 4.22.2.2.2 Home-routed Roaming - UE registered to different PLMNs

When the UE is registered to different PLMNs over 3GPP access and non-3GPP access, the MA PDU Session is established first over one access as specified in Figure 4.3.2.2.2-1 ("UE-requested PDU Session Establishment for home-routed roaming scenarios") and then over the other access with the following differences and clarifications:

- In step 1, the UE provides Request Type as "MA PDU Request" in UL NAS Transport message and its ATSSS Capabilities, as defined in clause 5.32.2 of TS 23.501 [2]. The UE indicates to AMF whether it supports non-3GPP access path switching. The UE also includes the PDU Session ID of the already established MA PDU Session.

- In step 2, if the AMF supports MA PDU sessions, then the AMF selects a V-SMF, which supports MA PDU sessions. If the AMF supports non-3GPP access path switching and the UE indicated in step 1 that the UE supports non-3GPP access path switching, the AMF may select a V-SMF and H-SMF supporting non-3GPP access path switching. If the UE provides Request Type "MA PDU Request" in step 1 and the UE context in SMF data from UDM includes SMF identity information for that PDU Session ID, the AMF selects the H-SMF indicated by UDM.

- In step 3, the AMF informs the V-SMF that the request is for a MA PDU Session (i.e. it includes an "MA PDU Request" indication). If the AMF supports non-3GPP access path switching while maintaining two N2 connections for non-3GPP access, the selected SMFs supports non-3GPP path switching and UE indicated in step 1 that the UE supports non-3GPP access path switching, the AMF indicates whether the UE supports non-3GPP path switching to the V-SMF.

- In step 6, the V-SMF informs the H-SMF that the request is for a MA PDU Session (i.e. it includes an "MA PDU Request" indication).

- In step 7, the H-SMF retrieves, via Session Management subscription data, the information whether the MA PDU session is allowed or not.

- In step 9, if dynamic PCC is to be used for the MA PDU Session, the H-SMF sends an "MA PDU Request" indication to H-PCF in the SM Policy Control Create message and the ATSSS Capabilities of the MA PDU session. The ATSSS capability of the MA PDU session that the H-SMF sends to H-PCF based on PDU session type of Ethernet includes only the ATSSS-LL functionality, regardless of whether UE and DNN configuration both support/allow MPQUIC-E functionality. The H-SMF provides the currently used Access Type(s) and RAT Type(s) for the MA-PDU session to the H-PCF. The H-PCF decides whether the MA PDU session is allowed or not based on operator policy and subscription data.

- In step 14, the V-SMF indicates support of non-3GPP path switching in the PDU Session Establishment Accept message.

- In step 16, the UE receives a PDU Session Establishment Accept message, which indicates to UE that the requested MA PDU session was successfully established. This message includes the ATSSS rules for the MA PDU session, which were derived by H-SMF and may include Measurement Assistance Information.

- After the MA PDU Session is successfully established on the first access, the UE shall initiate again the MA PDU Session establishment procedure in Figure 4.3.2.2.2-1 over the other access with the following differences and clarifications:

- In step 1, the UE shall send another PDU Session Establishment Request over the other access containing the same PDU Session ID that was provided over the first access. The UE also provides Request Type as "MA PDU Request" in UL NAS Transport message. The UE indicates to the AMF whether it supports non-3GPP access path switching.

- In step 2, if the AMF supports non-3GPP access path switching while maintaining two N2 connections for non-3GPP access, the may select a V-SMF that support non-3GPP access path switching.

- In step 3, if the AMF supports non-3GPP path switching and the UE indicated in step 1 that the UE supports non-3GPP access path switching, the AMF indicates whether the UE supports non-3GPP path switching to the V-SMF.

- In step 12, new UL N9 tunnel CN info is allocated by the H-SMF or by the H-UPF.

- In step 14, the V-SMF indicates support of non-3GPP path switching in the PDU Session Establishment Accept message.

- In step 16, the UE receives another PDU Session Establishment Accept message, which may contain updated ATSSS rules for the MA PDU session.

- After step 20, two N9 tunnels between the H-UPF and two different V-UPFs as well as two N3 tunnels between different V-UPF and RAN/AN are established, or two N3 tunnels, one is between V-UPF and RAN/AN over 3GPP access and the other is between H-UPF and RAN/AN over non 3GPP access, as well as one N9 tunnel between H-UPF and V-UPF are established.

\* \* \* \* Third change \* \* \* \*

##### 4.22.2.3.2 PDN Connections and Multi Access PDU Sessions

When the UE wants to request a new PDN Connection in EPC and wants to use this PDN Connection as user-plane resource associated with a MA PDU Session:

- The UE requests establishment of a new PDN Connection when the UE is registered via 3GPP access in EPS using PDN Connection Establishment procedure. The UE provides via PCO to PGW-C+SMF the following information:

- An indication that the PDN Connection is requested to be associated with a MA PDU Session.

- The UE's ATSSS capabilities as described in clause 5.32.2 of TS 23.501 [2].

- An indication that the UE is capable of supporting the ATSSS rule provisioning via 3GPP Access connected to EPC.

- The MME may select a PGW-C+SMF as described in TS 23.401 [13] and clause 4.11.0a.4.

NOTE 1: The selection of PGW-C+SMF in the correct 5GC slice requires the same mapping between EPC and 5GC slices as required for single-access PDU sessions. In order to select an ATSSS capable PGW-C+SMF it is assumed that the operator deployment ensures that all PGW-C+SMF(s) configured to support the specific APN in this network slice are also capable to support ATSSS. There is however no assumption that all PGW-U+UPFs need to support ATSSS, since PGW-C+SMF can make a selection of PGW-U+UPF taking the multi-access properties into account.

- The PGW-C+SMF determines based its capabilities whether the request can be accepted. The ATSSS capability of the MA PDU session that the PGW-C+SMF sends to PCF based on PDN type of Ethernet includes only the ATSSS-LL functionality, regardless of whether UE support MPQUIC-E functionality. The PCF decides whether the multi-access connectivity is allowed or not based on operator policy and subscription data, as described in clause 4.22.2. The PGW-C+SMF provides the following information in the PCO to the UE:

- An indication whether the request for using the PDN Connection for MA-PDU Session is accepted or not.

- If the UE has indicated that it is capable of supporting the MPTCP functionality and/or the MPQUIC-UDP functionality and/or MPQUIC-IP functionality or MPQUIC-E functionality and the PGW-C+SMF accepts to activate the MPTCP functionality and/or the MPQUIC-UDP functionality and/or MPQUIC-IP functionality or MPQUIC-E functionality, then the network provides MPTCP proxy information and/or MPQUIC proxy information corresponding to the activated MPQUIC-based steering functionality/functionalities to the UE, as described in clause 5.32.2 of TS 23.501 [2].

- UE Measurement Assistance Information (as described in clause 5.32.2 of TS 23.501 [2]).

- If the UE has indicated that it is capable of supporting the ATSSS rule provisioning via 3GPP Access connected to EPC, then the network is allowed to provide ATSSS rules via 3GPP Access connected to EPC.

After the PDN Connection establishment:

- If the UE registers to 5GC and wants to add non-3GPP user-plane resources, then the UE shall send a PDU Session Establishment Request over this access containing a "MA PDU Request" indication as described in clause 5.32.2 of TS 23.501 [2].

NOTE 2: Adding the PDU Session connectivity and user plane resources over non-3GPP access in 5GS allows the PGW-C+SMF to provide ATSSS rules to the UE via non-3GPP Access connected to 5GC.

- If the UE registers via non-3GPP access in EPC, the UE shall not trigger PDN Connection establishment to add non-3GPP/EPC access to the MA PDU Session.

When the UE wants to request a new MA PDU Session in 5GC/non-3GPP access, the description in clause 5.32.2 of TS 23.501 [2], applies. After the MA PDU Session establishment in 5GS/non-3GPP access, the description in clause 5.32.2 of TS 23.501 [2], applies with the following additions:

- If the UE is registered to EPC and wants to add user-plane resources on 3GPP access over EPC, then the UE shall send a PDN Connection Establishment Request over this access containing a "handover" indication and include a "MA PDU Request" indication in the PCO as well as the PDU Session ID of the existing MA PDU Session on non-3GPP access over 5GC.

- When the UE deregisters from the EPC access (but remains registered on the 5GC access), the MME will notify the PGW-C+SMF that the PDN Connection is released, as described in TS 23.401 [13]. The SMF can then notify the UPF that the access type has become unavailable.

In order to support EPS interworking when Ethernet type PDN Connection is not supported in EPS, the UE may use non-IP type PDN Connection when the UE establishes a PDN Connection in EPS as an added 3GPP access leg of an Ethernet type MA PDU Session. In this case, the UE and SMF shall locally associate the PDN Connection as an Ethernet type PDU Session as described in TS 23.501 [2]. When Ethernet type PDN Connection is not supported in EPS, the UE does not request to establish a PDN Connection with "MA PDU Request" indication before the UE registers to 5GS and establishes MA PDU Session over non-3GPP access.

A UE that has an established MA-PDU session over non-3GPP access in 5GC and 3GPP access in EPS, may be able to use EN-DC for the 3GPP access leg.

Depending on the RAT types supported by the UE, the PDN connection may also be handed over to 3GPP access in 5GC. For a UE supporting both E-UTRAN/EPC access and NG-RAN/5GC access, the user plane resources for 3GPP access may be moved between E-UTRAN/EPC access and NG-RAN/5GC access as described in clause 5.17.2 of TS 23.501 [2]. The PDU Session and User Plane resources active over non-3GPP/5GC access are not affected by such inter 3GPP access RAT change.

\* \* \* \* End of changes \* \* \* \*