**Title: Pre-SA2 #163 NWM Discussion for FS\_MASSS Rel-19 Conclusions**

**Source: Apple (FS\_MASSS Rapporteur)**

Key Issue #1.1

**Question KI#1.1.1:** Should one of the SUPIs be identified as primary SUPI or could either of two SUPIs be used to first register or request the PDU session establishment?

**Question KI#1.1.2:** Association of SUPIs

1. Should there be anassociation between the two SUPIs?
2. If yes to a), should it be maintained in UDM?
3. If yes to a), should the association also include Access Type/RAT restrictions?
4. If no to a), can the subscriptions reside in different UDMs?
5. If yes to b), should the two SUPIs of the DualSteer Device stored as a "DualSteer Pair" in UDM, with DualSteer Pair having its own identifier?

**Question KI#1.1.3:** Access and Mobility Subscription Data for DualSteer

1. Is there a need to enhance the Access and Mobility Subscription Data for DualSteer?
2. If yes to a), what additional information needs to be added?
3. Should the following information be considered?
4. an indication that the SUPI is part of a DualSteer subscription
5. the linked 2nd SUPI of the DualSteer subscription
6. DNN, S-NSSAI that are allowed for DualSteer switching

**Question KI#1.1.4:** Session Management Subscription Data for DualSteer

1. Is there a need to enhance the Session Management Subscription Data for DualSteer?
2. If yes to a), what additional information needs to be added?
3. Should the following information be considered?
4. combinations of DNN, S-NSSAI for which traffic switching between the two UEs is applicable along with the selected SMF for the given DNN, S-NSSAI?

**Question KI#1.1.5:** Is there aneed to associate the two PDU session requests from the DualSteer Device in SMF registration information and UE context in SMF data in UDM/UDR?

Key Issue #1.2

**Question KI#1.2.1:** Is it necessary to define when the UE decides to register to a second 3GPP access network and how the UE selects this 3GPP access network?

**Question KI#1.2.2:** Is there a need for the DualSteer Device to indicate to the AMF its capabilities to support for DualSteer during registration? The following has been considered:

1. whether it supports simultaneous/non-simultaneous data transfer
2. whether it acts (or can act) as the primary UE or secondary UE?

**Question KI#1.2.3:** Is there a need for the AMF to indicate to the DualSteer Device whether the network supports DualSteer during registration?

**Question KI#1.2.4:** Correlation id

1. Is it necessary to perform twoseparate registration procedures for each of the subscriptions/SUPIs?
2. Should there be a correlation id during registration to correlate the two registrations?
3. If yes to b), should this correlation id identify each 3GPP access leg uniquely?
4. If yes to b), would it be allocated by the DualSteer Device and communicated to the network via each UE registered access or would it be allocated by the UDM during UE registration procedure?

**Question KI#1.2.5:** Should the DualSteer device provide assistance information (e.g., the available PLMNs, additional RATs, UE location) to the network after registering its first SUPI to help registering the second SUPI (e.g. selecting a PLMN for it)?

**Question KI#1.2.6:** Should there be impact on AMF for Registration? For no AMF impact, it could be based on e.g. SMF redirection and it needs homogeneous deployment of SMFs that support DualSteer for a DNN/S-NSSAI.

Key Issue #1.3

**Question KI#1.3.1:** Should DualSteer PDU Session re-use the principles of MA PDU session?

**Question KI#1.3.2:** Can MA PDU Session be used directly for dual 3GPP accesses based on using e.g. the overlay-underlay architecture?

**Question KI#1.3.3:** Correlation id

1. Is it necessary to perform twoseparate PDU Session establishments for each of the subscriptions/SUPIs?
2. Should there be a correlation id defined to correlate the two PDU Session establishment?
3. If yes to b), should this correlation id identify each 3GPP access leg uniquely?
4. If yes to b), would it be allocated by the DualSteer Device and communicated to the network via each UE registered access or would it be allocated by the UDM during PDU Session establishment procedure?
5. If yes to b), would the correlation id be unique per S-NSSAI and DNN combination?

**Question KI#1.3.4:** Can the two PDU Session establishment requests use the same PDU Session ID and not rely on correlation id?

**Question KI#1.3.5:** Should the PDU Session establishment include the Linked SUPI information?

**Question KI#1.3.6:** Should the DualSteer device include DualSteer capabilitiesin the PDU Session establishment, e.g., supported steering functions (MPTCP, MPQUIC, DS-LL), supported steering modes (e.g., Active-Standby, etc.), and support for simultaneous or non-simultaneous data transfer?

**Question KI#1.3.7:** Should the DualSteer device include an indication in the PDU Session establishment whether the PDU session is applicable for potential DualSteer switching?

**Question KI#1.3.8:** Is there a need touse specific DNNs/S-NSSAIs for DualSteer PDU Session establishment?

**Question KI#1.3.9:** Should 3GPP specify how the DualSteer Device internally controls and coordinates the DualSteer feature, e.g. via a Control Function or Coordination Layer?

**Question KI#1.3.10:** Should AMF be impacted for PDU Session establishment? For no AMF impact, it could be based on e.g. SMF redirection and needs homogeneous deployment of SMFs that support DualSteer for a DNN/S-NSSAI.

**Question KI#1.3.11:** Anchoring

1. Should the DualSteer PDU session be always anchored in a common UPF and managed by a common SMF and potentially a common PCF?
2. Should SMF have the same SM policy association towards the PCF?
3. If yes to a), would it be required only for PDU Sessions that are subject to traffic switching?

**Question KI#1.3.12:** When the SMF links the two PDU sessions from the two SUPIs of DualSteer device, should the SMF (or UPF) allocate the same IP address for the linked PDU Sessions?

**Question KI#1.3.13:** Should SMF use same N4 session towards the UPF? Should SMF provide two SUPIs to UPF over N4?

**Question KI#1.3.14:** Steering functionalities

1. Is it necessary to define steering functionalities for the UE and UPF (e.g. DS-LL steering functionality, DS-HL steering functionalities including MPQUIC and MPTCP)?
2. How would MPTCP and MPQUIC steering functionalities apply to a DualSteer Device with no simultaneous transfer capability?

Key Issue #1.4

**Question KI#1.4.1:** URSP rules

1. Is it necessary to extend URSP rules?
2. Would URSP rules be associated with the DualSteer Device or would each SUPI of the DualSteer Device have its own URSP rules?
3. If extended URSP rules are supported, should the UE indicate its capability of enhanced URSP rules during the registration procedure?

**Question KI#1.4.2:** Which URSP extensions need to be supported?

1. the Access Type preference in Route Selection Descriptor is extended to include a Dual Steering indication or Multiple Accesses.
2. DualSteer ID and Linked SUPI added to Route Selection Descriptor. The AMF uses the Linked SUPI to query the UDM of the Linked SUPI to get the H-SMF ID and H-PCF ID in use for the PDU session of the Linked SUPI if already activated.
3. DualSteer service indication added to Route Selection Descriptor. It indicates if the traffic of the matching application is to be steered or switched via a PDU session.
4. RAT validity. The RAT validity, if included, is used to select the possible RAT combinations for the DualSteer communication. RAT validity values include:
   1. NR\_NR: this RSD applies to NR + NR combination, i.e. both SUPI 1 and SUPI 2 are in NR.
   2. NR\_LTE: this RSD applies to NR + LTE combination, e.g. SUPI 1 is in NR and SUPI 2 is in LTE
   3. NR: this RSD applies when the UE has only one access, and such access is over NR.
   4. LTE: this RSD applies when the UE has only one access, and such access is over LTE.
   5. (no RAT validity): the RSD applies to any RAT.
5. 3GPP access for DualSteer traffic steering. One single value of following 3GPP access:
   1. Existing activated 3GPP access, otherwise Primary 3GPP access
   2. Prefer Primary 3GPP access
   3. Prefer Secondary 3GPP access
   4. List of ordered PLMN and/or RAT
6. DualSteer traffic switching actions. One single value of following actions:
   1. switch to Primary 3GPP access whenever it becomes available
   2. switch to Secondary 3GPP access whenever it becomes available
   3. switch to the other 3GPP access if the current access status meets the condition of DualSteer traffic switching
   4. switch to the other 3GPP access whenever necessary

**Question KI#1.4.3:** Should a new UE policy be defined that can be used in combination with URSP, e.g. ASP (Access Selection Policy) that includes a PLMN selection preference and RAT preference for the access?

**Question KI#1.4.4:** For the registration of the Second SUPI, should the DualSteer Device be controlled by the following policy?

1. No restriction (UE of secondary SUPI can always attempt registration)
2. Only when primary SUPI is not registered
3. Only when primary 3GPP access is below a certain SINR/RSRP/RSSI threshold (similar to the mechanism defined in clause 23.6 in TS 36.300)
4. Location dependent (only attempt to register when in a specific area e.g., TAI(s), countries or PLMN(s))

**Question KI#1.4.5:** Should the following information be included in DualSteer policy (provided to both DualSteer Device and NF in the network):

1. Information that determines the 3GPP access network to be used for the new service (additional PLMN/PNI-NPN or an additional 3GPP access network within the same PLMN)
2. Information when to register the second SUPI
3. Information when to establish a secondary PDU Session
4. Information that determines how to switch the service between two connected 3GPP access networks.

**Question KI#1.4.6:** PCC rules

1. How the PCC rules should be extended?
2. Would a PCC rule only apply to one of the PDU sessions or to both PDU Sessions?

**Question KI#1.4.7:** Is it possible to re-use ATSSS Rules to enforce DualSteer policies in the UL direction? DualSteer rules and ATSSS rules can be differentiated by e.g. using a new Access Descriptor parameter.

**Question KI#1.4.8:** Is it possible to re-use N4 Rules to enforce DS policies in the DL direction?

**Question KI#1.4.9:** If ATSSS and N4 rules are re-used, which steering modes need to be supported:

1. Active-Standby?
2. Smallest Delay?
3. Priority-Based?

**Question KI#1.4.10:** Is there a need for the DualSteer policy to identify each 3GPP access leg uniquely, e.g. in a form of a Registration-ID? If yes, would the network provide individual UE/SUPI specific rules or complete DualSteer policy that can be provided to either of the UE/SUPI of the DualSteer device?

**Question KI#1.4.11:** Is it necessary to include the following elements for the DualSteer policy?

1. an indication to indicate "Terrestrial Network (TN) access has higher priority than Non-Terrestrial Network (NTN) access " or "Non-Terrestrial Network (NTN) access has higher priority than Terrestrial Network (TN) access"
2. an indication to indicate "HPLMN has higher priority than VPLMN" or "VPLMN has higher priority than HPLMN"

Key Issue #2.1

**Question KI#2.1.1:** MPQUIC steering functionalities are to be defined at least based on CONNECT-IP and CONNECT-Ethernet.

1. Should these steering functionalities be defined as a new Steering Functionality (i.e. multiple MPQUIC steering functionalities, each one associated with a specific proxy mode) or be part of the existing Rel-18 MPQUIC Steering Functionality (i.e. a single MPQUIC steering functionality encompassing multiple proxy modes)?
2. Should CONNECT-TCP be also supported?

**Question KI#2.1.2**: This is the latest proposal from the conclusion paper to negotiate the CONNECT method to be used: "During MA PDU Session Establishment with an IP-based PDU Session type, the UE indicates to SMF what CONNECT methods it supports. The SMF is configured, as part of the DNN configuration, what proxy protocols are supported. The SMF determines what CONNECT methods are supported for the MA PDU Session, considering UE capabilities, network capabilities and network local policies and indicates that to the UE in PDU Session Establishment Accept. If multiple CONNECT methods are supported for a traffic flow, the UE selects the CONNECT method based on the application type (e.g. UDP or TCP) and/or based on UE implementation."

1. Should SMF determine a single CONNECT method to be supported for the MA PDU Session based on network local policies and indicate that to the UE in PDU Session Establishment Accept?
2. If no to a), should the UE select the CONNECT method based on the application type (e.g. UDP or TCP) and/or based on UE implementation?

**Question KI#2.1.3**: Should MPQUIC Connect-IP steering functionality be allowed to be used with Ethernet MA PDU Sessions?

Key Issue #2.2

**Question KI#2.2.1:** Should co-locating ePDG with the PSA UPF and using null encryption for IPSec between UE and ePDG be supported to simplify ATSSS deployment?

**Question KI#2.2.2:** Should NULL encryption IPSec tunnels be allowed for the MA PDU Session user plane traffic between UE and N3IWF?

**Question KI#2.2.3:** Should N3IWF/TNGF be allowed to stop initiating Child SA for the PDU Session as well as not to apply security for the UP of the PDU Session?

**Question KI#2.2.4:** Is there a need to define an architecture which keeps the NAS signalling between UE and CN over non-3GPP access?

**Question KI#2.2.5:** Should "non-3GPP access without 5G NAS over non-3GPP" be supported to simplify the network operation over non-3GPP access? This assumes an architecture without TNGF/N3IWF where the UE connects to the UPF via the public IP network over a new interface.

1. Should the connection between the UE and the UPF only secured using TLS over the non-3GPP access? Is there a need to establish an IPSec security association (this assumes the UPF is enhanced to support IPSec)?
2. Should MPQUIC steering functionality be the only steering functionality to be defined? Should MPTCP be supported?
3. Would the UE authentication solely rely on authenticating the UE via 3GPP access only?
4. For MA PDU Session establishment, should it be transparent to the AMF or should AMF be enhanced to support simplified ATSSS procedures over non-3GPP access?
5. If the UE loses 3GPP access coverage, should the MA PDU Session be kept until a specified timer value expires?