**3GPP TSG-WG SA2 Meeting #162 *S2-2404060r05***

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**Source: ETRI, Xiaomi**

**Title: New Sol. to KI #1.3: Enhancement to session management procedures to support DualSteer**

**Document for: Approval**

**Agenda Item: 19.13**

**Work Item / Release: FS\_MASSS / Rel-19**

*Abstract: This paper proposes a new solution for KI #1.3.*

# 1. Introduction

TR 23.700-54 describes the key issue #1.3 “Session management aspects for DualSteer” including the following:

- Whether and how to enhance session management functions and procedures for DualSteer traffic steering of a new service to a 3GPP access network and/or the DualSteer traffic switching across two 3GPP access networks belonging to the same PLMN (either HPLMN or VPLMN) or two different PLMNs or PLMN and PNI-NPN, which may further include the following:

- Whether and what enhancements are required in PDU Session establishment/modification/release;

Regarding to the key issue #1.3, this contribution proposes the following enhancement to session management procedure to support DualSteer.

- DualSteer PDU session ID (DSssnId) may be assigned by H-SMF during the PDU Session establishment procedure.

- DSssnId may be removed during the PDU Session release procedure.

- DSssnId may be used by DualSteer Device to indicate the PDU Session to be switched.

# 2. Proposal

It is proposed to include the following changes in TR 23.700-54 V0.2.0.

\* \* \* \* Start of change \* \* \* \*

# 6 Solutions

## 6.0 Mapping of Solutions to Key Issues

Table 6.0-1: Mapping of DualSteer Solutions to Key Issues

|  |  |
| --- | --- |
|  | Key Issues for DualSteer |
| Solution# | <Key Issue #1.1> | <Key Issue #1.2> | <Key Issue #1.3> | <Key Issue #1.4> |
| #X: Enhancement to session management procedures to support DualSteer |  |  | **X** |  |
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\* \* \* \* Second change **(ALL NEW TEXT)** \* \* \* \*

### 6.1.X Solution #X: Enhancement to session management procedure to support DualSteer

#### 6.1.X.1 Description

This solution provides session management procedures for DualSteer Device. Two NR/5GC accesses in two different VPLMNs scenario is used to describe the solution.

##### 6.1.X.1.1 Background

Not all sessions from a DualSteer Device can be allocated to one SMF. SMF selection may be affected by various parameters including DNN. Figure 6.1.X.1.1-1 can be an example and following steps of example scenario.

1. SUPI1 establishes PDU session to DNN1.
2. SUPI1 establishes PDU session to DNN2.
3. SUPI1’s PDU Session to DNN2 is required to traffic switch to RAT2, for any reason, e.g, QoS
4. DualSteer traffic switching procedure is to be initiated and SUPI1’s PDU Session to DNN2 is about to switch over to SUPI2 anyhow.
5. Question is which SMF should be selected for this DualSteer traffic switching?

Managing association of SUPIs is not enough to support SMF selection.

It is required to manage association of PDU sessions for DualSteer traffic switching.



Figure 6.1.X.1.1-1: DualSteer PDU session ID for **DualSteer** device in 5GS

##### 6.1.X.1.1 DualSteer PDU session

A DualSteer PDU session is a PDU session that is established with Request type of “DualSteer”. It has the potential for DualSteer switching.

In order to support DualSteer PDU session, this solution assumes:

* there is a convergence layer to handle control and traffic between SUPI1 and SUPI2 of DualSteer Device; and

##### 6.1.X.1.3 DualSteer PDU session ID

Having an identifier for a DualSteer PDU session is efficient than referring it by (SUPI, PDU session ID) pair. This solution introduces DualSteer PDU session ID that represents a DualSteer PDU session of a SUPI to PLMN and RAT combination.



Figure 6.1.X.1.3-1: DualSteer PDU session ID for **DualSteer** device in 5GS

DualSteer PDU session ID is allocated by H-SMF during a DualSteer PDU session establishment procedure for a DualSteer PDU session and is sent to UE.

##### 6.1.X.1.4 Method of DualSteer traffic switching

This solution makes use of PDU Session Establishment procedure for DualSteer traffic switching. Assuming a PDU session from SUPI1 is established, new PDU Session from SUPI2 is established and the old PDU session from SUPI1 is released after DualSteer traffic switching from old PDU session of SUPI1 to new PDU session of SUPI2.

There are two alternatives of assigning DualSteer PDU session ID for DualSteer traffic switching.

Alternative 1: The old PDU session of SUPI1 and the new PDU session of SUPI2 will have the same DualSteer PDU session ID as in Figure 6.1.X.1.4-1.



Figure 6.1.X.1.4-1: DualSteer PDU session ID (Alternative 1) for **DualSteer** device in 5GS

Alternative 2: DualSteer PDU session IDs of the old PDU session of SUPI1 and of the new PDU session of SUPI1 are different as in Figure 6.1.X.1.4.-2.



Figure 6.1.X.1.4-2: DualSteer PDU session ID (Alternative 2) for **DualSteer** device in 5GS

#### 6.1.X.2 Procedures

Clause 6.1.X.2.1 shows PDU Session Establishment procedure for DualSteer Device.

Clause 6.1.X.2.2 shows PDU Session Establishment procedure with DualSteer traffic switching initiated by UE

Clause 6.1.X.2.3 describes PDU Session Release procedure for DualSteer PDU session.

Only the functions different from clauses 4.3.2.2.2, 4.3.4.2 and 4.3.4.3 of TS 23.502 are described.

##### 6.1.X.2.1 PDU Session Establishment procedure for DualSteer Device

This procedure assumes SUPI1 is registered to VPLMN1\_RAT1. UE of DualSteer Device is establishing a DualSteer PDU session with SUPI1.



Figure 6.1.X.2.1-1: PDU Session Establishment procedure for DualSteer

1. UE with SUPI1 sends PDU Session Establishment to AMF with RequestType of “DualSteer”.

2-7. same as steps 2 to 6 in clause 4.3.2.2.2 of TS 23.502 with the following differences:

* AMF selects SMF with DualSteer capability; and
* SMF decides to continue home routed DualSteer PDU session establishment procedure for DualSteer PDU session and discovers H-SMF with DualSteer capability.

8. SMF allocates DualSteer PDU session ID for the DualSteer PDU session.

9-12b. same as steps 9 to 12 in clause 4.3.2.2.2 of TS 23.502 with the following differences:

* SMF selects PCF with DualSteer capability; and
* SMF selects UPF with DualSteer capability.

12c. SMF registers with UDM including DSssnId1.

13. DualSteer PDU session ID (DSssnId1) is included in PDU Session Establishment Accept message and is provided to the UE.

14-22. same as steps 14 to 22 in clause 4.3.2.2.2 of TS 23.502.

##### 6.1.X.2.2 PDU Session Establishment procedure with DualSteer traffic switching initiated by UE (Alternative 1)

This procedure assumes SUPI1 is registered and has a DualSteer PDU session on VPLMN1\_RAT1, which is referred as DSssn1. Based on DualSteer policy, DualSteer Device decided to switch the DSssniD1 to VPLMN2\_RAT2. If it is not registered to VPLMN2\_RAT2, it first initiates registration procedure.

For the sake of DualSteer traffic switching, DualSteer Device initiates PDU Session Establishment procedure with Request type of DualSteer using SUPI2 to VPLMN2\_RAT2. All parameters in PDU Session Establishment Request message other than SUPI and PDU Session ID shall be same ones used for PDU Session Establishment Request of DSssnId1.



Figure 6.1.X.2.2-1: PDU Session Establishment procedure for DualSteer traffic switching initiated by UE

1. UE with SUPI2 sends PDU Session Establishment to AMF with RequestType of “DualSteer”. PDU Session Establishment message includes [Indication of DualSteer traffic switch request, DualSteer PDU session ID (DSssnId1) to be switched]. Parameters in PDU Session Establishment Request message other than SUPI and PDU Session ID shall be same with the ones used for PDU Session Establishment Request of DSssnId1.

2. AMF may select H-SMF by querying UDM with DSssnId1 or from SMF identity of H-SMF in notification from. The UDM may notify DSssnId1 and SMF identity to the AMF after step 12c in Figure 6.1.X.2.1-1 if the AMF has subscribed SMF Selection Subscription data from UDM in registration procedure.

3-6. same as steps 3 to 6 in clause 6.1.X.2.1.

7. Subscription data from UDM includes DualSteer authorization information for SUPI2 and associated SUPI, i.e. SUPI1.

8. SMF further verifies SUPI1’s switch to SUPI2’s DualSteer PDU session being established. DNN, PDU Session type, SSC mode and S-NSSAI of the two DualSteer PDU sessions should be same. SMF allocates DualSteer PDU session ID for the DualSteer PDU session. The DualSteer PDU session ID is DSssnId1 which is allocated to SUPI1 .

9. same as steps 9 in clause 6.1.X.2.1.

10. H-SMF shall allocate the same UPF that is allocated for targetDSssnId, i.e. DSssnId1. SMF may allocate same IP address with the IP address allocated to DSssnId1.

11-12. same as steps 11 to 12 in clause 6.1.X.2.1.

13. Indication of DualSteer traffic switch accepted, and targetDSssnId i.e. DSssnId1 that is switched are included in PDU Session Establishment Accept message.14-22. same as steps 14 to 22 in clause 6.1.X.2.1.

23. UE or H-SMF triggers to release the old PDU Session that was switched over and initiates PDU Session release procedure.

##### 6.1.X.2.3 PDU Session Establishment procedure with DualSteer traffic switching initiated by UE (Alternative 2)

This procedure is same with clause 6.1.X.2.2 with following difference:

8. SMF allocates a new DualSteer PDU session ID for the DualSteer PDU session.

13. Allocated new DualSteer PDU session ID, Indication of DualSteer traffic switch accepted, and targetDSssnId i.e. old DualSteed PDU session ID that is switched are included in PDU Session Establishment Accept message.

##### 6.1.X.2.4 PDU Session Release procedure for DualSteer PDU session

All steps in clause 4.3.4.2 and 4.3.4.3 of TS 23.502 are same with the following difference:

* UE and SMF may not remove DSssnId during PDU Session release procedure of the PDU session switched over. DSssnId may be removed during PDU Session release procedure of the final release of the DualSteer PDU session. (Alternative 1)
* UE and SMF may remove DSssnId during PDU Session release procedure. (Alternative 2)

#### 6.1.X.3 Impacts on services, entities and interfaces

**Impact on UE**:

- The UE may include DualSteer as Request Type.

- The UE may decide and trigger DualSteer traffic switching with PDU Session Establishment Request message including Indication of DualSteer traffic switch request, target DualSteer PDU session ID to be switched.

- The UE may trigger release of a DualSteer PDU session that is switched over.

**Impact on AMF**:

-    The AMF may select SMF with DualSteer capability querying UDM.

**Impact on SMF**:

-    The SMF may select H-SMF, PCF, or UPF with DualSteer capability querying UDM.

-    The SMF may allocate and remove DualSteer PDU session ID.

-    The SMF may verify DualSteer switching of a DualSteer PDU session to associated SUPI.

-    The SMF may include (DualSteer PDU session ID, Indication of DualSteer traffic switch accepted and target DualSteer Session ID that is switched in PDU Session Establishment Accept message) in PDU Session Establishment Accept message.

-    The SMF may trigger data forwarding for the DualSteer PDU session that is switched over.

- The SMF may trigger release of the DualSteer PDU session that is switched over.

**Impact on UDM**:

- The UDM may store DualSteer subscription and associated SUPI as subscription data.

- The UDM may store DualSteer PDU Session ID in SM subscription data.

- The UDM may provision subscription data that contains DualSteer subscription and associated SUPI.

- The UDM may provision H-SMF information for a DualSteer PDU Session ID.

**Impact on UDR**:

- The UDR may store “DualSteer subscription” in subscription data of a UE.

Editor's note: The usage of the term UE or DualSteer Device will be clarified

\* \* \* \* End of change \* \* \* \*