**SA WG2 Meeting #162 S2-2405223**

**Changsha, China, April 15 –19, 2024 (revision of S2-2404568)**

**Source: LG Electronics**

**Title: KI#1.1, KI#1.2, KI#1.3, KI#1.4, New Sol: Support of DualSteer PDU Session using overlay-underlay architecture**

**Document for: Approval**

**Agenda Item: 19.13**

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

*Abstract of the contribution: This paper proposes a new solution for KI#1.1, KI#1.2, KI#1.3 and KI#1.4.*

# Discussion

This paper proposes a new solution for KI#1.1, KI#1.2, KI#1.3 and KI#1.4.

# Proposal

It is proposed to agree the following changes into TR 23.700-54.

\* \* \* \* Start of 1st Change \* \* \* \*

## 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** | X | X | X | X |
|  |  |  |  |  |

\* \* \* \* Start of 2nd Change \* \* \* \* (All new text)

6.1.X Solution #X: Support of DualSteer using overlay-underlay architecture

6.1.X.1 Description

A DualSteer Device has two SUPIs (i.e. two USIMs) and corresponding PEIs and the DualSteer Device may register to the network over two 3GPP accesses using each SUPI and corresponding PEI.

NOTE: This solution does not describe when and how the UE triggers second registration over underlay network. Any other solutions address this aspect can be considered together with this solution.

The PCF provides enhanced URSP rule to the UE which contains DualSteer preferred information in the Route Selection Descriptor, i.e., Access Type preference is set to "DualSteer". The PCF generates the "DualSteer" preference based on UE context policy control subscription information retrieved from the UDR. In order to support this, the UE indicates its capability of enhanced URSP rule in the policy container during the registration procedure.

Table 6.2-1: UE context policy control subscription information

| Information name | Description | Category |
| --- | --- | --- |
| Subscriber categories | List of category identifiers associated with the subscriber | Optional |
| Tracing Requirements | Tracing requirements as defined in TS 32.421 [18] | Optional |
| PEI | The Permanent Equipment Identifier of the UE. | Optional |
| OSId | Identifies the operating system supported by UE. | Optional |
| Indication of UE support for ANDSP | Indicates the UE support for ANDSP. | Optional |
| Indication of URSP Provisioning Support in EPS | Indicates the UE support for URSP Provisioning in EPS. | Optional |
| S-NSSAI subscription information | Contains the list of subscribed S-NSSAIs, its associated subscribed DNNs. For each DNN, it includes the Allowed PDU Session types, the Allowed SSC modes, LBO roaming allowed indication, the ATSSS information (NOTE 1) and the DualSteer information (NOTE 3). | Optional |
| Subscriber spending limits control | Indicates whether the PCF must enforce UE policies based on subscriber spending limits. | Optional |
| CHF address | The address of the Charging Function and optionally the associated CHF instance ID and CHF set ID (see clause 6.3.1.0 of TS 23.501 [2]). | Optional |
| Subscriber spending limits identifiers and statuses of the policy counters | List of spending limits identifiers and statuses of the Policy Counters. | Optional |
| Restricted Status | Indicates that the UE has a status of Restricted, lists its accompanying reason(s) and the Time stamp of when this status was stored (NOTE 2). | Optional |
| NOTE 1: ATSSS information is defined in Table 5.2.3.3.1-1 of TS 23.502 [3] and Indicates whether MA PDU Session establishment is allowed.NOTE 2: Accompanying reason is according to Exception IDs defined in Table 6.7.5.1-1 of TS 23.288 [24]. For example, Unexpected UE location.NOTE 3: DualSteer information indicates whether MA PDU Session establishment is allowed using overlay-underlay architecture. This subscription information is configured to only one of UE that operator intends to allow DualSteer service e.g. UE#1 in Figure 6.1.X.1-1. |

Based on the received URSP rules, the DualSteer Device may use overlay-underlay architecture and establishes MA PDU Session to use dual 3GPP accesses as shown in Figure 6.1.X.1-1 as below.

- The UE#1 registers to the 5GC via NG-RAN#1.

- The UE#2 registers to the 5GC via NG-RAN#2 and establishes a PDU Session to provide underlay network to the UE#1.

- The UE#1 selects N3IWF of overlay network and registers to the 5GC through the underlay network provided by the UE#2's PDU Session.

NOTE: There is no impact to N3IWF selection and the UE#2's PDU Session to provide connectivity to UE#1 is dedicated to the UE#1, e.g. by using dedicated DNN/S-NSSAI for the PDU Session that provides connectivity to the N3IWF.

- The UE#1 establishes a Multi-Access PDU Session over NG-RAN#1 and over N3IWF through the underlay network.



Figure 6.1.X.1-1: Overlay-underlay architecture for DualSteer

The SMF of the MA PDU Session does not know whether the access leg over non-3GPP access is established for DualSteer. In order to let the SMF knows that the non-3GPP access leg is used for DualSteer, when a UE establishes MA PDU Session over N3IWF of overlay network, the UE includes indication of DualSteer in the PDU Session Establishment Request message. The indication is reported to the PCF so that PCF can update PCC rule to avoid traffic splitting over dual 3GPP accesses. Alternatively, the operator can configure their network so that DualSteer is only used with specific DNN and S-NSSAI combination so that network applies DualSteer policy without any indication from the UE.

When the PCF generates PCC rule, the PCF can consider whether to allow simultaneous transmission or not. If the PCF does not allow simultaneous transmission, the PCF generates PCC rule so that all services using the MA PDU Session is transferred over single access.

When the DualSteer Device wants to use actual non-3GPP access, the UE#1 in the DualSteer Device can trigger non-3GPP path switching procedure as described in clause 4.22.9.5 of TS 23.502 [4] or MOBIKE per IETF RFC 4555 [x].

If the DualSteer device registers to the same network over two 3GPP accesses, i.e., overlay network and underlay network is the same network, the DualSteer Device may be served by the same cell. In order to avoid such situation, the operator can set different RFSP Index value in UE#1's and UE#2's subscription data.

6.1.X.2 Procedures

During the Registration procedure, the UE indicates capability of enhanced URSP rule in the policy container.

Reuse existing MA PDU Session Establishment with following changes:

- When a UE establishes MA PDU Session via non-3GPP access though underlay network with 3GPP access, the UE indicates that the request is for DualSteer.

- SMF reports the DualSteer indication to the PCF.

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

**UE:**

- support enhanced URSP rule that indicates DualSteer preference.

- indicates DualSteer when the UE establishes MA PDU Session via non-3GPP access though underlay network with 3GPP access.

**SMF:**

- reports DualSteer indication to the PCF.

**PCF:**

- support enhanced URSP rule that indicates DualSteer preference.

- based on DualSteer indication from the SMF, updates PCC rule to avoid traffic splitting over dual 3GPP accesses.

**UDR:**

- Update UE context policy control subscription information to indicate whether DualSteer is preferred.

\* \* \* \* Start of 3rd Change \* \* \* \*

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non‑specific.

- For a specific reference, subsequent revisions do not apply.

- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document in the same Release as the present document.

[1] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".

[2] 3GPP TS 22.261: "Service requirements for the 5G system".

[3] 3GPP TS 23.501: "System architecture for the 5G System (5GS)".

[4] 3GPP TS 23.502: "Procedures for the 5G System (5GS)".

[5] 3GPP TS 23.503: "Policy and charging control framework for the 5G System (5GS); Stage 2".

[6] IETF RFC 9298: "Proxying UDP in HTTP".

[7] IETF RFC 9484: "Proxying IP in HTTP".

[8] IETF draft-ietf-masque-connect-ethernet: "Proxying Ethernet in HTTP".

Editor's note: The above document cannot be formally referenced until it is published as an RFC.

[9] IETF RFC 9114: "Hypertext Transfer Protocol Version 3 (HTTP/3)".

[10] IETF draft-ietf-httpbis-connect-tcp: "Template-Driven HTTP CONNECT Proxying for TCP".

Editor's note: The above document cannot be formally referenced until it is published as an RFC.

[11] IETF RFC 9297: "HTTP Datagrams and the Capsule Protocol".

[12] IETF RFC 9000: "QUIC – A UDP based Multiplexed and Secured Protocol".

[13] IETF RFC 9001: "Using TLS to Secure QUIC".

[14] IETF RFC 9002: "QUIC Loss Detection and Congestion Control".

[15] IETF RFC 9221: "An Unreliable Datagram Extension to QUIC".

[16] IETF draft-ietf-quic-multipath: "Multipath Extension for QUIC".

Editor's note: The above document cannot be formally referenced until it is published as an RFC.

[17] 3GPP TR 23.700‑53: "Study on access traffic steering, switching and splitting support in the 5G system architecture; Phase 3".

[18] IETF RFC 9369: "QUIC Version 2".

[19] IETF RFC 9220: "Bootstrapping WebSockets with HTTP/3".

[20] 3GPP TS 33.402: "3GPP System Architecture Evolution (SAE); Security aspects of non-3GPP accesses".

[x] IETF RFC 4555: "IKEv2 Mobility and Multihoming Protocol (MOBIKE)".

\* \* \* \* End of Changes \* \* \* \*