**SA WG2 Meeting #162 S2-2404668r01**

**15 - 19 April, 2024, Changsha, China (revision of S2-2401940)**

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**Title: FS\_MASSS KI#x New solution for policy enhancement for DualSteer**

**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 new policy enhancement for the FS\_MASSS TR 23.700-54.*

# 1 Discussion

This paper proposes for policy enhancement for DualSteer addressing KI#x Policy Enhancement.

**The following considerations apply to the solution**

1. **Each UE has two USIMs for 3GPP accesses i.e. DualSteer device. The two USIMs belongs to the same MNO.**

**For DualSteer scenario, usually the VPLMN and HPLMN coverage coexist in a certain area. And for the DualSteer device (with two USIMs), both USIMs belong to the same HPLMN.**

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1) let one USIM register directly to HPLMN, another USIM register to VPLMN and perform Home Routing to HPLMN; or

2) let one USIM register to a RAT of HPLMN, another USIM register to another RAT of HPLMN; or

3) let one USIM register to 5GS HPLMN, another USIM register to EPS HPLMN.

**How to realize the scenarios (1, 2, 3) above belongs to KI#x registration**

2) The UE policy coordination point is in H-PCF, **the H-PCF can provision the URSP via 5G and/or EPC following the mechanism defined in R18 eUEPO.**

3) The UE policy enhancement is used only for selection of 3GPP access, which has been established by the UE when finishing PLMN selection and registration. In other words, **the UE policy enhancement does not affect existing PLMN selection and registration mechanism.**

4) The URSP policy has been used to steer the traffic in different PDU session, however it has the following limitation which cannot fully fulfil the DualSteer requirements:

- It is used within a certain USIM when the USIM has finished the PLMN selection and Registration, but in DualSteer case, both of the two USIM may have the URSP rules which matches a certain traffic.

- The current URSP rule only indicates Access Type preference per 3GPP or non-3GPP access, finer granularity (to differentiate the RAT and core network scenarios mentioned in 2) needs to be considered.

Therefore, **the UE policy needs be enhanced to address the aspects above. Considering the backward compatibility and the limitation of current URSP evaluation mechanism, it is proposed to introduce a separate UE policy which is used in combination with the current URSP rule.**

# 2 Proposal

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

**\* \* \* \* Start of Changes (All text new) \* \* \* \***

## 6.X Solution #X: Access Selection Policy for selecting a registered UE for traffic transmission

### 6.X.1 Description

This solution is to resolve KI#1.4 on policy enhancement.

**The following considerations apply to the solution:**

1) **Each UE has two USIMs for 3GPP accesses i.e.** **DualSteer device. The two USIMs belongs to the same MNO.**

**For DualSteer scenario, usually the VPLMN and HPLMN coverage coexist in a certain area. And for the DualSteer device (a DualSteer device with two USIMs), both USIMs belong to the same HPLMN.**

For DualSteer scenario, usually the VPLMN and HPLMN coverage coexist in a certain area. And for the DualSteer device (a UE with two USIMs), both USIMs belong to the same HPLMN. The DualSteer device needs to

1) let one USIM register directly to HPLMN, another USIM register to VPLMN and perform Home Routing to HPLMN; or

2) let one USIM register to a RAT of HPLMN, another USIM register to another RAT of the HPLMN; or

3) let one USIM register to 5GS HPLMN, another USIM register to EPS HPLMN.

**How to realize the scenarios (1, 2, 3) above belongs to Key Issue #1.2: Registration and mobility management for DualSteer.**

2) The UE policy coordination point is in H-PCF, **the H-PCF can provision the URSP via 5G and/or EPC following the mechanism defined in R18 eUEPO.**

3) **The UE policy enhancement is used only for selection of 3GPP access**, which has been established by the UE when finishing PLMN selection and registration. In other words, **the UE policy enhancement does not affect existing PLMN selection and registration mechanism.**

4) The URSP policy has been used to steer the traffic in different PDU session, however it has the following limitation which cannot fully fulfil the DualSteer requirements:

- It is used within a certain USIM when the USIM has finished the PLMN selection and Registration, but in DualSteer case, both of the two USIM may have the URSP rules which matches a certain traffic.

- The current URSP rule only indicates Access Type preference per 3GPP or non-3GPP access, finer granularity (to differentiate the RAT and core network scenarios mentioned in 2) needs to be considered.

Therefore, **the UE policy needs be enhanced to address the aspects above. Considering the backward compatibility and the limitation of current URSP evaluation mechanism, it is proposed to introduce a separate UE policy (named ASP, Access Selection Policy) which is used in combination with the URSP policy.**

#### 6.x.1.1 New ASP policy for selecting a registered PLMN for DualSteer traffic transmission

A new UE policy called ASP (Access Selection Policy) is introduced, in which the ASP includes the following aspects:

Each ASP rule has a **Traffic descriptor:** identify the application traffic. The format and value can be the same as the TD in URSP rule. Then, under each traffic descriptor, it has

**- Rule precedence:** UE evaluate the ASP rules accordingly

**- PLMN selection preference and RAT preference for the access:** indicate the PLMN ID and RAT type of a 3GPP access via which the application traffic should be transmitted. This entry can have one or more values, UE need to select one of them (no priority list);

**-** CN preference: indicate the preferred CN type to handle the access.

**-** Access selection Validation Criteria: indicates the restrictions of the ASP. The ASP is not considered valid unless all the provided Validation Criteria are met.

An example ASP is as following, when an application traffic appears, it firstly evaluates which Traffic descriptor it can be matched, and then select an PLMN ID and RAT type for which the UE has registered, if there is no registered PLMN ID and matched RAT type in this entry, the UE will further evaluate the next matched traffic descriptor and so on. Then the UE will use the URSP rules corresponding to the PLMN ID.

NOTE: A default “matching all” ASP rule may be configured for all the traffic, in the case that there is no ASP rule can be matched for a specific traffic, the default “matching all” ASP rule is enforced.

**Table 6.X.1-1: Access Selection Rule**

| Information name | Description | Category | PCF permitted to modify in a UE context | Scope |
| --- | --- | --- | --- | --- |
| Rule Precedence | Determines the order the ASP rule is enforced in the UE. | Mandatory | Yes | UE context |
| **Traffic descriptor** | *This part defines the traffic descriptors for the policy* |  |  |  |
| Application identifiers | Application identifier(s) | Optional | Yes | UE context |
| IP descriptors | IP 3 tuple(s) (destination IP address or IPv6 network prefix, destination port number, protocol ID of the protocol above IP) | Optional | Yes | UE context |
| Non-IP descriptors | Descriptor(s) for non-IP traffic | Optional | Yes | UE context |
| …… |  |  |  |  |
| **PLMN preference** | Indicates the preferred PLMN (NOTE1). | Mandatory | Yes | UE context |
| **RAT preference** | Indicates the preferred 3GPP RAT: e.g. NR-TN, NR-NTN, E-UTRA (NOTE1). | Mandatory | Yes | UE context |
| **CN type preference** | Indicate the preferred CN type: e.g. 5GS、EPS | Optional | Yes | UE context |
| **Service Priority Level** | Indicates the priority level of the services matching the Traffic descriptor (NOTE2). | Optional | Yes | UE context |
| **Access selection Validation Criteria** | *This part defines the ASP Validation Criteria components* | Optional | Yes | UE context |
| Time Window | The time window when the matching traffic is allowed. The ASP rule is not considered to be valid if the current time is not in the time window. | Optional | Yes | UE context |
| Location Criteria | The UE location where the matching traffic is allowed. The ASP rule is not considered to be valid if the UE location does not match the location criteria. | Optional | Yes | UE context |
| NOTE 1: The PLMN preference and RAT preference are only used to select the preferred access network from the already registered access network of the DualSteer Device.  NOTE 2: The information is used when conflicts between different rules occur. For example, if only non-simultaneous transmission is supported while two different services prefer different UE to send the traffic, the Service Priority level will be used to decide which rule will be enforced prior to others. | | | | |

## 6.X.2 Procedures



**Figure 6.x.2-1: procedure for UE to evaluate ASP and URSP for DualSteer** (messages/behaviours with potential new impact are in ***italic and bold***)

Step-1 and 2: The USIM-1(UE1) and USIM-2(UE2) separately perform PLMN selection and registration as defined in clause 4.2.2.2 of TS 23.502[4] and/or any new enhancement to registration in KI#1.2. The AMF and SMF are not necessarily the same for USIM-1 and USIM-2. But the PCF should be the same.

NOTE: Any new enhancement to registration belongs to KI#1.2

Editor’s Note: it is FFS how to select to the same H-PCF for USIM-1 and USIM-2 of a DualSteer device.

Step-3: When subscribed by the two UEs’ serving AMF(s) for UE policy provisioning, PCF triggers the UCU procedure, as defined in clause 4.2.4.3 of TS 23.502[4], to provision ASP towards the DualSteer Device (via either USIM-1 or USIM-2)

Step-4: PCF triggers the UCU procedure, as defined in clause 4.2.4.3 of TS 23.502[4], to provision URSP rules separately towards USIM-1 and USIM-2 of the DualSteer Device.

Step-5: When a new application traffic appears (e.g. Application-a), the DualSteer Device firstly evaluates ASP to find a matched ASP Rule and select the UE (UE-1 or UE-2) which has registered via the required PLMN ID and RAT type in the matched ASP rule. If no UEs registered to the required PLMN ID and RAT type, the DualSteer Device will further check the next priority ASP rule which matched the Application traffic.

Step-6: The selected UE evaluates its URSP rules and associates the Application traffic to an PDU session as defined in clause 6.6.2.3 of TS 23.503[5]. If needed, a new PDU session will be established for the association.

Step-7: When the access of the PDU session is released or not available, the DualSteer Device may re-evaluate the ASP and URSP as described in step-5 and 6. The re-evaluation may lead to a traffic switching between two 3GPP accesses to the PDU sessions with the same UPF anchor.

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

**DualSteer Device:**

* Support the Access Selection Policy, which is used to determine which USIM/UE is used for the traffic transmission for a service.

**AMF:**

* No impacts.

**PCF:**

* Support to determine the Access Selection Policy when the associated two USIMs/UEs registered to the network.
* Support provisioning of Access Selection Policy to DualSteer Device.

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