**SA WG2 Meeting #150E S2-2202469r03**

**6 – 12 April 2022, e-meeting**

**Source: Lenovo, Apple**

**Title: Solution for KI#1: VPLMN influencing URSP rules creation in an HPLMN**

**Document for: Approval**

**Agenda Item: 9.22**

**Work Item / Release: FS\_eUEPO / Rel-18**

*Abstract of the contribution:*

# 1 Discussion

The solution described below covers KI#1 and supports the following aspects:

- How a VPLMN can influence URSP rules creation at the HPLMN

- How the HPLMN configures URSP rules to the UE that are applicable when the UE accesses the VPLMN

To support the objectives of KI#1 it is proposed to re-use the procedure defined in Release 17 on application guidance for URSP rule creation with the additional enhancement on allowing an Application Function in a VPLMN to influence URSP rules creation at an HPLMN. The AF in the visited PLMN provides the service information re-using the service specific information provisioning procedure described in 3GPP TS 23.502 with the following addition:

- The AF includes an indication to apply this rule only when UEs register to a specific PLMN.

The trigger for the AF request could be due to:

- AF service provider of a VPLMN wishes to use specific DNN/S-NSSAI handling for roaming UEs

- A trigger by the Network Slices Capability Enablement Server defined in 3GPP TS 24.434. The NSCE server may be located in an AF. The NSCE server may receive from an NSCE client (located in a UE) a network/slice notification remapping for an application based on configuration provided by the NSCE server to the NSCE client in the UE.

The NEF stores the AF request information in the UDR in the “Application Data” field within the Service Specific Information Data Subset together with the assigned Transaction Reference ID (provided by the AF).

When the PCF receives the updated subscription information from the UDR the PCF derives updated URSP rules for a UE (or any UE) including in the URSP rule information indicating to the UEs to apply this URSP rules only when routing traffic via a specific PLMN. This is supported by including in the Route Selection Descriptor of the URSP rule validity conditions including a PLMN identity. If the UE determines an applicable URSP rule for detected application traffic then the UE considers the Route Selection Descriptor valid if the PLMN identity of the validity condition matches the PLMN identity of the registered PLMN.

# 2 Proposal

The following solution is proposed.

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\* First change (all new text) \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

# 6 Solutions

## 6.0 Mapping of Solutions to Key Issues

Table 6.0-1: Mapping of Solutions to Key Issues

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Key Issues | | | |
| Solutions | 1 | 2 | 3 | 4 |
| x | x |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
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## 6.X Solution #X: VPLMN influencing URSP rules in an HPLMN

### 6.X.1 Description

Editor's note: This clause will describe the solution principles and architecture assumptions for corresponding key issue(s) which should be explicitly stated. Clause(s) may be added to capture details.

To support the objectives of KI#1 it is proposed to re-use the procedure defined in Release-17 on application guidance for URSP rule creation with the additional enhancement on allowing an Application Function in a VPLMN to influence URSP rules creation at an HPLMN. The AF in the visited PLMN provides the service information re-using the service specific information provisioning procedure described in 3GPP TS 23.502 [x] with the following addition:

- The AF includes an indication to apply this rule only when UEs register to a specific PLMN.

The trigger for the AF request could be due to:

- AF service provider of a VPLMN wishes to use specific DNN/S-NSSAI handling for roaming UEs

- A trigger by the Network Slices Capability Enablement Server defined in 3GPP TS 24.434 [y]. The NSCE server may be located in an AF. The NSCE server may receive from an NSCE client (located in a UE) a network/slice notification remapping for an application based on configuration provided by the NSCE server to the NSCE client in the UE.

The NEF stores the AF request information in the UDR in the “Application Data” field within the Service Specific Information Data Subset together with the assigned Transaction Reference ID (provided by the AF).

When the PCF receives the updated subscription information from the UDR the PCF derives updated URSP rules for a UE (or any UE) including in the URSP rule information indicating to the UEs to apply this URSP rules only when routing traffic via a specific PLMN. This is supported by enhancing the Route Selection Descriptor of the URSP rule including a PLMN identity. There are several options on how the RSD component can be enhanced:

- Option 1: New validation criteria in RSD

- Option 2: Use existing validation criteria i.e. the location criteria, where the location could be set to e.g. 3GPP location"={PLMN,location}

- Option 3: Include a new RSD parameter (i.e. not validation criteria) to identify the PLMN

If the UE determines an applicable URSP rule for detected application traffic then the UE considers the Route Selection Descriptor valid if the PLMN identity of the validity condition matches the PLMN identity of the registered PLMN. The new RSD component that include PLMN identity are set by the PCF as higher priority so that the UE evaluates the first.

### 6.X.2 Procedures

Editor's note: This clause describes high-level procedures and information flows for the solution.

#### 6.x.2.1 VPLMN AF guidance for URSP rule creation at an HPLMN.

A call flow of the procedure is shown below.



**Figure 6.x.2.1-1: Procedure to influence URSP rules for a different PLMN**

Steps are as follows:

1. AF in VPLMN is triggered to request to the home PLMN of a UE a specific handling of routing traffic to the VPLMN

2. The AF invokes a service operation with the NEF including in the request updated service information as described in 3GPP TS 23.502 [x] clause 4.15.6.10. The updated information includes a validity conditions to apply a URSP rule in a specific PLMN (or a list of PLMN). The request is applicable for any UE or the AF may include external identifiers of the UE.

Editor's Note: Since the allowed S-NSSAI in one PLMN can also apply to the equivalent PLMNs indicated in a TAI list in registration accept. When UE moves from one PLMN to another equivalent PLMN, the allowed S-NSSAI still need to be used. How to guarantee it in this solution is FFS.

2a-2c The NEF may authorize the request with the UDM as per 3GPP TS 23.502 [x]

3a When the authorization is successful the NEF updates the data in the UDR including within Application Data the updated service information. The NEF invokes an Nudr\_DM\_Create (or Update) service request requested the UDR to store the service information in the “Application Data” Data Set within the Service Specific Information Data Subset identifier. The NEF may also include a Data Key the target UEs or Group of UEs.

3b. The UDR acknowledges the NEF request.

3c. The NEF acknowledges the AF request

4a. If the PCF has subscribed to Service Specific Information the UDR notifies the PCF of the updated service information

4b. When a UE registers to the H-PLMN (or VPLMN) the UE includes a list of PSIs. The AMF (in HPLMN) or V-PCF (in VPLMN) initiates a UE Policy Association Create request with the PCF including in the request the list of PSIs associated to the HPLMN.

4c. The PCF may retrieve Application Data subscription information from the UDR

5. The PCF creates updated URSP rules including URSP rules with validity conditions on per PLMN basis according to the information stored in the UDR.

6. The PCF provides updated URSP rules to the UE by initiating a UE Configuration Update for transparent policy delivery (via the V-PCF if the UE is roaming) to deliver updated URSP rule to a UE.

6b. The UE acknowledges successful installation of rules

7. If the AF has subscribed to notification of successful policy delivery the PCF notifies the UDR

8a-8b The UDR informes the NEF of successful policy delivery

9a-9b. The NEF informs the AF of successful policy delivery

#### 6.x.2.2 UE behaviour on applying a URSP rule with a PLMN validity condition in route selection descriptor

The UE upon reception of URSP rules including a PLMN validity conditions within Route Selection Descriptors enforces the URSP rules as follows:

- When the UE finds that application traffic matches traffic descriptor of a URSP rules the UE checks the list of Route Selection Descriptors of the matched URSP rule

- If an RSD in the list of RSDs contains PLMN validity conditions the UE checks if the PLMN identity within the validity conditions matches the PLMN identity of the registered PLMN or an equivalent PLMN of the registered PLMN.

- If there is match the UE considers the RSD valid and and routes the application traffic according to the contents of the route selection descriptor

- If there is no match the UE considers the RSD as invalid and continues to process a second RSD in the list of RSD of the matched URSP rules if available.

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

Editor's note: This clause captures impacts on existing 3GPP nodes and functional elements.

- URSP rule is enhanced with a PLMN identity validity condition within Route Selection Descriptors

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