**3GPP TSG-WG SA2 Meeting #162 *S2-2404820***

**Changsha, China, April 15th – 19th, 2024 (revision of S2-240xxxx)**

**Source: ZTE**

**Title: KI#1: Update on solution#7**

**Document for: Approval**

**Agenda Item: 19.9**

**Work Item / Release: FS\_eEDGE\_5GC\_ph3 / Rel-19**

*Abstract: This paper proposes update on solution#7 in TR 23.700-49.*

# 1. Text Proposal

It is proposed to capture the following changes vs. TR 23.700-49.

\* \* \* \* First change \* \* \* \*

## 6.7 Solution #7: EAS deployment information report from L-SMF/L-UPF

### 6.7.1 Description

This solution is for key issue 1.

This solution is enhancement of Option D in TS 23.548[x]. The current Option D is quoted below:

*Option D: If the SMF has been configured that DNS Queries for an FQDN (range) query can be locally routed on the UL CL, then the subsequent DNS Queries for the FQDN (range) will be locally routed to a Local DNS server.*

In this option the SMF has been preconfigured with the FQDN (range) that can be locally routed on the ULCL. The AF can invoke AF influence procedure or provide the EAS Deployment Information to SMF, with FQDN(s) for applications deployed in the Local part of the DN.. In order to reduce the impact on SMF, this solution proposes that these information can be provided from the Local part of the DN directly towards the SMF, e.g. the L-SMF/L-UPF in the Local part of the DN provides the FQDN (range) towards the SMF.. After the detection of the FQDN in the DNS Query message the SMF can insert the I-UPF and L-SMF/L-PSA and route the DNS Query message towards the Local DNS server via L-PSA.

This solution is applicable for Session breakout connectivity model.

Editor Note: It is FFS how this solution can be applicable for the Multiple PDU Sessions connectivity model and Distributed Anchor connectivity model.

### 6.7.2 Procedures

#### 6.7.2.1 No L-SMF insertion



Figure 6.7.2.1-1 No L-SMF insertion

Step 0, The N4 Node level Association is established between the SMF and the L-PSA. During this procedure, the L-PSA provides the S-NSSAI, DNN, FQDN(range) that can be served by the L-PSA , Local DNS server address and associated DNAI.

Step 1, The UE establishes a PDN session towards the SMF. In this procedure the SMF configures the EASDF to detect the FQDN range of the DNS Query request message.

Step 2, The UE sends DNS Query Request message with the target FQDN over the user plane of the PDU session.

Step 3, The EASDF detects that the DNS Query message with the target FQDN.

Step 4, The EASDF forwards the DNS Query Request message with the target FQDN to the SMF and notifies that the FQDN is detected.

Step 5-6, The SMF determines that the DNS query can be routed to an Local DN, it selects target DNAI. If the SMF determines that it can support the DNAI, the SMF selects the L-PSA based on the target DNAI. , The SMF insert an ULCL/BP and L-PSA associated with that Local DNS server for the PDU Session.

Step 7, The SMF forwards the DNS Query Request towards the ULCL/BP, and ULCL/BP forwards the DNS Query Request to Local DNS server via the L-PSA, similar as Option D in TS 23.548.

#### 6.7.2.2 L-SMF insertion after the I-SMF



Figure 6.7.2.2-1 L-SMF insertion after the I-SMF

Step 1, The SMF subscribes the notification of new L-SMF serving the target S-NSSAI and DNN newly registered in the NRF, or L-SMF profile has been updated.

Step 2, The L-SMF is registered in the NRF. The NF profiles includes the S-NSSAI, DNN, FQDN(range) that can be served by the L-SMF, Local DNS server address and associated DNAIs. When new L-UPF is deployed the L-UPF establishes N4 Node Association and the L-UPF provides the FQDN(range), Local DNS server address and associated DNAI. The L-SMF then update the NF profile stored in the NRF.

Step 3, The NRF notify the SMF about the NF profiles of the newly registered L-SMF , or the updated NF profile of L-SMF.

Step 4, The SMF generates the BaselineDNSPattern based on the NF profiles of the new registered L-SMF and invokes Neasdf\_BaselineDNSPattern\_Create/Update service operation of the EASDF to create/update the BaselineDNSPattern.

Step 5, the UE establishes a PDN session towards the SMF. In this procedure the SMF configures the EASDF to detect the FQDN range of the DNS Query request message. An I-SMF is inserted for the PDU session.

Step 6, The UE sends DNS Query Request message with the target FQDN over the user plane of the PDU session.

Step 7, The EASDF detects that the DNS Query message with the target FQDN.

Step 8, The EASDF forwards the DNS Query Request message with the target FQDN to the SMF and notifies that the FQDN is detected.

Step 9, The SMF determines that the DNS query can be routed to an Local DN, it selects target DNAI. The SMF may determine that the I-SMF can support the DNAI, then the SMF sends Nsmf\_PDUSession\_Update Request to the I-SMF, including the DNS Query Request message and the target DNAIs.

Step 10, The I-SMF selects L-SMF based on the target DNAI.

Step 11, The I-SMF invokes Nsmf\_PDUSession\_Create Request (SUPI, GPSI(if available), SMF SM Context ID, CN-Tunnel-Info, etc.) towards the L-SMF to establish user plane tunnel between the I-UPF and L-PSA controlled by the L-SMF.

Step 12, The L-SMF establishes N4 session with the L-PSA.

Step 13, The L-SMF sends Nsmf\_PDUSession\_Create Response(CN-Tunnel-Info, etc.) to the I-SMF.

Step 14, The I-SMF forwards the DNS Query Request towards the I-UPF, and the I-UPF forwards the DNS Query Request to Local DNS server via the L-PSA, similar as Option D in TS 23.548.

#### 6.7.2.3 L-SMF insertion after the SMF



Figure 6.7.2.3-1 L-SMF insertion after the SMF

Step 1, The SMF subscribes the notification of new L-SMF serving the target S-NSSAI and DNN newly registered in the NRF, or L-SMF profile has been updated.

Step 2, The L-SMF is registered in the NRF. The NF profiles includes the S-NSSAI, DNN, FQDN(range) that can be served by the L-SMF, Local DNS server address and associated DNAIs. When new L-UPF is deployed the L-UPF establishes N4 Node Association and the L-UPF provides the FQDN(range), Local DNS server address and associated DNAI. The L-SMF then update the NF profile stored in the NRF.

Step 3, The NRF notify the SMF about the NF profiles of the newly registered L-SMF, or the updated NF profile of L-SMF.

Step 4, The SMF generates the BaselineDNSPattern based on the NF profiles of the new registered L-SMF and invokes Neasdf\_BaselineDNSPattern\_Create/Update service operation of the EASDF to create/update the BaselineDNSPattern.

Step 5, the UE establishes a PDN session towards the SMF. In this procedure the SMF configures the EASDF to detect the FQDN range of the DNS Query request message.

Step 6, The UE sends DNS Query Request message with the target FQDN over the user plane of the PDU session.

Step 7, The EASDF detects that the DNS Query message with the target FQDN.

Step 8, The EASDF forwards the DNS Query Request message to the SMF and notifies that the FQDN is detected.

Step 9, The SMF determines that the DNS Query Request can be routed to an Local DN, it selects a target DNAI. The SMF may determine that SMF/I-SMF cannot support the DNAI, then the SMF selects L-SMF based on the target DNAIs.

Step 10, The SMF invokes Nsmf\_PDUSession\_Create Request(SUPI, GPSI(if available), SMF SM Context ID, CN-Tunnel-Info, etc.) towards the L-SMF to establish user plane tunnel between the PSA and L-PSA controlled by the L-SMF.

Step 11, The L-SMF establishes N4 session with the L-PSA.

Step 12, The I-SMF sends Nsmf\_PDUSession\_Create Response(CN-Tunnel-Info, etc.) to SMF.

Step 13, The SMF forwards the DNS Query Request towards the PSA, and the PSA forward the DNS Query Request to Local DNS server via the L-PSA.

### 6.7.3 Impacts on services, entities and interfaces

L-PSA:

- The L-PSA is enhanced to report the FQDN range that can be handled by the L-PSA ,the associated Local DNS Server address and associated DNAI to L-SMF.

L-SMF(New NF):

- The L-SMF is introduced to control the L-PSA.

- L-SMF registers the FQDN range, the associated Local DNS Server address and associated DNAI in the NRF.NRF:

- The NF profile of L-SMF is based on SMF profile, and further include the FQDN range, the associated Local DNS Server address and associated DNAI.

SMF:

- Subscribe the notification on the NF profile change of L-SMF serving the S-NSSAI and DNN.

- Receives the NF profile of the L-SMF and update the BaselineDNSPattern in the EASDF.

- The SMF is enhanced to insert the ULCL/BP/L-PSA or insert L-SMF/L-PSA after the SMF/I-SMF based on the detection of the FQDN and forward the DNS Query towards the ULCL/BP/L-PSA

\* \* \* \* End of changes \* \* \* \*