Source: Samsung Electronics Co. Ltd

**Title: [FS\_MS\_NS\_Ph2] Key Issue #6: Resolve slice-specific application instances**

**Agenda Item: 2.7**

**Document for: Discussion and Agreement**

# **Introduction**

During the MBS SWG Ad-hoc Post 120-e meeting on September 8, 2022, a contribution S4aI221369 was discussed that covered the aspect of resolving slice specific 5GMS AS instances. Few comments were received during the call. This contribution revises the proposed text in the above contribution based on the received comments, and includes some discussion on the reasons for the change.

# **Discussion**

Few key points relevant to the discussion for this topic are included below:

- The IP address for the UE is scoped to the PDUSession as described in clause 5.8 of TS 23.501

- Clause 5.15 of TS 23.501 describes the relationship between a network slice instance and PDUSession – “*A PDUSession belongs to one and only one specific Network Slice instance per PLMN. Different Network Slice instances do not share a PDU Session, though different Network Slice instances may have slice-specific PDU Sessions using the same DNN.*”

The notion of network slicing specified by 3GPP is to enable sharing of RAN, core, and transport (sub)-networks to provide a logical instantiation of network called as a network slice instance. Communication services can be delivered through these network slice instances. However, the implementation of network slicing using the underlying network can be achieved through multiple ways e.g., using network technologies such as MPLS, VXLAN, L2VPN, L3VPN, SRV6 [1][2][3]. These network technologies provide the ability to create network overlays over the same underlying network infrastructure, thus enabling the creation of network slices.

3GPP specifies that network slice instances terminate at the UPF, and the N6 subnet connecting the UPF to the DN is not part of a network slice instance. However, as described above, and in clause 4.3.2 of TS 23502, a PDU session association includes the N6 subnet into the DN. With a network slice created using any of the network technologies above, routing table entries should be available to forward traffic in the network slice to a destination in the DN. Therefore, a 5GMS AS instance in the DN is likely to be reachable from any network slice given the routing table entries are properly configured and DNS entries are populated correctly.

# **References**

[1] “A Realization of IETF Network Slices for 5G Networks Using Current IP/MPLS Technologies”, IETF draft, <https://www.ietf.org/id/draft-srld-teas-5g-slicing-00.html>, 2022

[2] [J. Ordonez-Lucena](https://pubmed.ncbi.nlm.nih.gov/?term=Ordonez-Lucena%20J%5BAuthor%5D), [P. Ameigeiras](https://pubmed.ncbi.nlm.nih.gov/?term=Ameigeiras%20P%5BAuthor%5D), [L. M. Contreras](https://pubmed.ncbi.nlm.nih.gov/?term=Contreras%20LM%5BAuthor%5D), [J. Folgueira](https://pubmed.ncbi.nlm.nih.gov/?term=Folgueira%20J%5BAuthor%5D), [D. R. López](https://pubmed.ncbi.nlm.nih.gov/?term=L%C3%B3pez%20DR%5BAuthor%5D), “On the Rollout of Network Slicing in Carrier Networks: A Technology Radar”, Sensors 2021, 21, 8094. DOI: 10.3390/s21238094

[3] S. Bhattacharjee., K. Katsalis, O. Arouk, R. Schmidt, T. Wang, X. An, T. Bauschert, N. Nikaein, “Network Slicing for TSN-Based Transport Networks” IEEE Access. 2021;9:62788–62809. doi: 10.1109/ACCESS.2021.3074802

 **Proposal**

We propose that the following change be adopted into TR 26.941 for key issue #6.

**===== 1. CHANGE =====**

## 6.6 Key Issue #6: Slice resource resolution

### 6.6.1 Description

#### 6.6.1.1 Resolve slice-specific application instances

Editor’s Note: Key issue to cover study objective of identifying methods for deploying, supporting, and resolving slice-specific 5GMS AS instances. Solutions all levels – higher layer methods such as modification of media description documents to lower layer methods using networking protocols – can be included.

TS 26.501 describes procedures for download media streaming wherein the 5GMS Application Provider configures a provisioning session using the M1 interface at the 5GMS AF and an ingest session using the M2 interface at the 5GMS AS. With network slicing, the UE may have multiple PDU sessions using which the UE may receive content for a media service. Depending on the media service, different network slices may provide different quality of service or packet treatment behaviour for media streams sent through those network slices. To enable media streaming through multiple network slices, it is possible that one or more 5GMS AS instances serve different network slices. Traditional media streaming solutions include steps wherein the UE is informed of media streaming endpoint information of 5GMS AS instances using media description documents (e.g., DASH MPD). With this information, UE knows how to resolve the media streaming endpoints so they can request streaming of media content from those 5GMS AS instances. However, with multiple possible 5GMS AS instances serving different network slices, the issue remains that how a UE resolves the appropriate 5GMS AS instance for requesting media content.

Open issues:

- Whether and how application layer solutions can assist in informing endpoint information of slice-specific 5GMS AS instances to the UE.

- Whether and how lower level networking and routing procedures can assist in resolving slice-specific 5GMS AS instances.

### 6.6.2 Candidate solutions

#### 6.6.2.x Candidate solution #x: DNS based resolution of slice-specific 5GMS AS instances

Figure 6.6.2.x-1 illustrates the procedure for DNS based resolution of slice-specific 5GMS AS instances.



**Figure 6.6.2.x-1: Procedure for DNS based resolution of slice-specific 5GMS AS instances**

The steps are as follows:

1. The 5GMS Application Provider configures a provisioning session at the 5GMS AF at reference point M1.

a. The provisioning session configuration at 5GMS AF is as described in clause 5 for downlink media streaming and clause 6 for uplink streaming as specified in TS 26501.

b. The information about slice-specific AS instance is stored in the DNS server by the 5GMS AF if 5GMS AF is the authoritative owner of the DNS hostname

c. Alternatively, the information about slice-specific AS instance is stored in the DNS server by the 5GMS Application Provider if 5GMS Application Provider is the authoritative owner of the DNS hostname

2. The 5GMS Application Provider provides service announcement information to the 5GMS-Aware Application in the UE as described in step 4 of clause 5.1 for downlink streaming and step 4 of clause 6.1 for uplink streaming in TS 26501

3. (Optional) In case the 5GMSd Client in UE received only a reference to the Service Access Information, then it acquires the Service Access Information from the 5GMS AF as described in step 6 of clause 5.1 of TS 26501

4. The 5GMS Client in the UE resolves the slice-specific 5GMS AS information using DNS resolution methods at the DNS server.

5. The M5 Media Session Handling procedure is then performed as specified in step 7 of clause 5.1 for downlink media streaming and step 7 of clause 6.1 for uplink media streaming in TS 26501

6. The M4 Media Streaming procedures are then carried out as specified in step 8 of clause 5.1 for downlink media streaming and step 8 of clause 6.1 for uplink media streaming in TS 26501

**===== END CHANGES =====**