Source: Samsung Electronics Co. Ltd

**Title: [FS\_MS\_NS\_Ph2] Collaboration Scenarios with Network Slicing**

**Agenda Item: 8.10**

**Document for: Discussion and Agreement**

# **Introduction**

During the SA#96 meeting, a study item SP-220675 on media streaming aspects of network slicing Phase 2 was officially agreed and the work on this study item is scheduled to begin during the SA4#120e meeting.

Traditional media service collaboration scenarios such as MNO CDN, OTT collaboration, and MNO media processing can be provided with network slicing enabler defined in 3GPP standards. These collaboration scenarios can be realized using network slicing by requesting the setting up of these media services, as described in TS 26.501[A] and TS 26.512[B], in a given network slice, for example, by providing a Slice Id (S-NSSAI) and DNN to the 5GMS Provisioning AF. This document describes the collaboration scenarios in relation to how application service providers can request setup and access of network slices.

# **Collaboration scenarios with network slicing**

3GPP TS 28.530 [C] describes multiple roles related to network slicing such as the Communication Service Customer (CSC), Communication Service Provider (CSP), Network Operator (NOP), Network Slice Customer (NSC), and Network Slice Provider (NSP). An organization can play one or more roles at the same time depending on the deployment. Based on the specification in [C], many collaboration scenarios can be provided as described in [H], but the scenarios for network slicing for a third-party customer can be boiled down to the following two types:

- Operator managed slice: In this scenario, the MNO performs the role of the NOP, NSP, and the CSP. Customers (e.g., third-party service providers) request setting up communication services in the network slice managed by the network operator. The third-party customer does not have any information about the slice internals, and completely relies on the operator to set up the resources requested by the third party in a network slice and make the service accessible to customer’s users in that slice.

For operation of the service, the customer negotiates service requirements with the operator, and the operator provisions necessary control and management functions to set up end-to-end network slice spanning different slice domains (e.g., RAN, Core, Transport). One way of negotiating service requirements is the use of Generic Slice Template (GST) attributes defined by the GSM Association [H]. More details about GST attributes and study of GST in 3GPP SA2 and SA6 groups is discussed in another contribution S4-221057 [AA].

- NSaaS (Network Slice as a Service): In this scenario, the MNO performs the role of NOP and NSP - i.e., the provider of a network slice to requesting third-party customers. The customer, for example an MVNO (Mobile Virtual Network Operator), as the NSaaS consumer, can then enhance the network slice (for example by adding custom network functions, modifying slice configuration etc.), and subsequently act as a CSP for its own customers.

This scenario becomes relevant in our SA4 study because the application service provider can function as the MVNO and thus receive network slice as a service from the operator. This scenario is a result of a number of service requirements specified by 3GPP SA1 in clause 6.10 (Network capability exposure) of TS 22.261 [E]. An excerpt of the requirements from clause 6.10.2 of [E] that apply to this scenario are listed below:

***6.10.2 Requirements***

*..*

*Based on operator policy, a 5G network shall provide suitable APIs to allow a trusted third-party to create, modify, and delete network slices used for the third-party.*

*Based on operator policy, the 5G network shall provide suitable APIs to allow a trusted third-party to monitor the network slice used for the third-party.*

*Based on operator policy, the 5G network shall provide suitable APIs to allow a trusted third-party to define and update the set of services and capabilities supported in a network slice used for the third-party.*

*..*

*The 5G network shall provide suitable APIs to allow a trusted third-party to get the network status information of a private slice dedicated for the third-party, e.g. the network communication status between the slice and a specific UE.*

Given the above requirements in [E], and network slicing capabilities described in[C], facilities can be provided to customers (application service providers) to better monitor, control, and use the provisioned network slices.

3GPP SA6, in TR 23.700-99 [F], documented aspects about how a service provider may request creation and control of network slice in the operator network through the NSCE (Network Slice Capability Enablement) server. The normative work for network slice capability enablement for application service is being specified in TS 23.435 [G].

The third-party customer may also have the ability to set up a network slice spanning multiple MNO networks. Therefore, this scenario will work with the multiple-MNO collaboration scenarios described in clauses A.8 and A.9 of TS 26.501.

# **References**

[AA] 3GPP SA4#120-e contribution, S4-221057: “[FS\_MS\_NS\_Ph2] Overview of Network slicing feature and capabilities”

# **Proposal**

Based on description in clause 2, we propose that the following change be adopted into TR 26.941.

**===== 1. 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".

[A] 3GPP TS 26501: "5G Media Streaming (5GMS); General description and architecture".

[B] 3GPP TS 26512: "5G Media Streaming (5GMS); Protocols".

[C] 3GPP TS 28.530: "Management and orchestration; Concepts, use cases and requirements".

[D] Void

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

[F] 3GPP TS 23.700-99: "Study in Network slice capability exposure for application layer enablement (NSCALE)".

[G] 3GPP TS 23.435: "Procedures for Network Slice Capability Exposure for Application Layer Enablement Service".

[H] NG.116: "Generic Network Slice Template", GSMA,   
<https://www.gsma.com/newsroom/wp-content/uploads//NG.116-v6.0.pdf>

[I] 3GPP TS 28.545: "Management and orchestration; Fault Supervision (FS)"

[J] 3GPP TS 28.546: "Management and orchestration of networks and network slicing; Fault Supervision (FS); Stage 2 and stage 3".

[K] 3GPP TS 28.552: "Management and orchestration; 5G performance measurements".

[L] 3GPP TS 28.554: "Management and orchestration; 5G end to end Key Performance Indicators (KPI)"

**===== 2. CHANGE =====**

# 5 Relevant network slicing Use Cases

Editor’s Note: This clause to cover possible network slicing related use case collaboration scenarios and deployment architectures.

## 5.1 General

Editor’s Note: This clause to include text to describe the overview and relevance of below two scenarios

## 5.X Scenario 1: Operator-managed network slicing

In the operator-managed network slice scenario, the operator instantiates, configures, and manages a network slice that can be used by one or more customers (e.g., third-party service providers). A customer intending to provide a service to its users with differentiated quality of service or experience, requests that the operator sets up communication services in a network slice through which its users can access the customer’s service. The customer does not have any information about the slice internals, and completely relies on the operator to set up the resources requested by the customer in a network slice and make the service accessible to that customer’s users in that slice.

The customer and the operator negotiate a set of service requirements based on the expectation of the service that the customer intends to provide to its users. One way of negotiating service requirements is the use of GST attributes specified by GSM Association in [H]. Some of the performance-related GST attributes resemble the QoS service requirements specified in TS 26.501 [A] and TS 26.512 [B] as part of the M1d reference point specification.

NOTE: A detailed mapping between the GST attributes and the QoS attributes specified in [A] and B is for future study.

In this scenario, an Application Service Provider, as a customer of the operator providing a network slice, can negotiate service parameters to be provided in a network slice. Based on the negotiated service requirements, the operator provisions necessary control and management functions to enable the setting up of an end-to-end network slice spanning different slice domains (e.g., RAN, Core, Transport etc.). The operator-provided management functions manage the end-to-end operation of the network slice and guarantee the availability of application functions that are deployed in that slice. 3GPP TS 28.545 [I], TS 28.546 [J], TS 28.552 [K], TS 28.554 [L] define fault management and performance management capabilities which can be used to measure and assure the health of different slice resources.

By delegating these functions to the Mobile Network Operator, a media Application Service Provider can focus on media service delivery, using the 5G Media Streaming capabilities defined in TS 26.501 and TS 26.512, by interacting with the application functions provisioned in the network slice.

## 5.Z Scenario 2: Third-party-managed network slicing

In this scenario, a third party entity requests that the operator creates a network slice based on certain requirements. The operator creates a network slice and hands over the network slice to the third party entity. This mode of operation is specified by 3GPP SA5 in [C] and is referred to as NSaaS (Network Slice as a Service). Once the slice is handed over, the third party entity can enhance the network slice e.g., by adding custom network functions, modifying slice configuration etc.

A method for negotiating requirements for NsaaS service is the use of GST attributes specified by the GSM Association [H]. In addition to the performance-related character attributes, a number of scalability-related attributes can be used to describe the requirements of the slice to be provisioned in the 5G System.

The third party entity can then provide the network slice resources to its customers. As described in the previous scenario, customers of the third party entity can then negotiate with the third party entity to set up communication services in that network slice. The users of the customers will then be able to access the customer’s service using the provisioned network slice.

An Application Service Provider can function as the third party entity in this scenario and can receive a provisioned network slice as a service from the Mobile Network Operator. In this case, the Application Service Provider may, in addition to the capabilities described in [A] and [B], also have additional facilities to control and manage the resources of the network slice.

NOTE: It is for future study to identify how the capabilities available as a NSaaS consumer specified in [C] benefit an Application Service Provider whose role is specified in [A] and [B]. This scenario is therefore not considered further in the present document.

Editor’s Note: [F] and [G] are to be monitored for specification related to the interface capabilities between the third party entity and the NSCE (Network Slice Capability Enablement) server for control of network slices.

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