Source: Samsung Electronics Co. Ltd

**Title: [FS\_MS\_NS\_Ph2] Key Issues on service provisioning and dynamic policy**

**Agenda Item: 8.10**

**Document for: Discussion and Agreement**

# **Introduction**

Contribution S4-230249 submitted to SA4#122 describes a topic of network slice service continuity and migration of application flows to a different network slice because of overloaded and underperforming network slices as part of a study conducted in 3GPP SA2. This contribution presents couple of key issues based on above study for inclusion in TR 26941.

# **Moving media flows to alternate slices**

2.1 Use case 1: Network slice service continuity

Consider a 5GMS Application Provider intending to provide a 5G media service in an MNO network using different enablers specified in TS 26.501 and TS 26.512. To provide a media service with network slicing:

* The 5GMS Application Provider performs offline negotiation with the OAM on the service level requirements for the media service (e.g., using the GST attributes as discussed in clause 4.3 of TR 26941). The OAM provides a network slice within which the media service is to be provisioned. The network slice is assumed to provide required SLA for the media service. The OAM uses 3GPP SA5 and CT3 defined procedures [1][2][3][4] to monitor the performance of the network slice during the session and provide service level assurance
* The 5GMS Application Provider uses M1 to provision the media service at the 5GMS AF. As part of this provisioning procedure, the 5GMS Application Provider configures a number of features such as content hosting, content preparation, dynamic policy, consumption and metrics reporting etc. as defined in TS 26.501 and TS 26.512.

For policy management, clause 7.9 of TS 26.512 specifies Policy Templates Provisioning API using which the 5GMS Application Provider configures a set of Policy Templates within the scope of the Provisioning Session. A Policy Template is identified by its *policyTemplateId*  and represents a set of PCF/NEF parameters which define the service quality and associated charging for the corresponding downlink or uplink media streaming sessions. When the Policy Template is used for QoS Flows the *M1QOSSpecification* is included in the provisioning information. Also included is the *ApplicationSessionContext* information that provides information about slice and dnn for which the policy template is applicable.

As described in contribution S4-230249 submitted to this meeting (which refers to a study in TR 23700-41), a network slice or slice instance could be overloaded, or the network performance of the network slice cannot meet the SLA. All the solutions studied during the study stage for Key Issue #1 and documented in TR 23700-41 propose methods where an ‘alternative slice’ is identified to move the traffic from the PDU session in current slice to a PDU session in that alternative slice. This creates two gaps in our SA4 specifications:

1. Policy provisioning (over M1): Current policy template provisioning API as defined in clause 7.9 of TS 26.512 configures ApplicationSessionContext information which points to a single slice and dnn combination. If SA2 defines that the application flows be migrated to an alternate slice (as documented in TR 23700-41), then we may need to enhance policy template provisioning to include the alternate slice information so such a migration can be supported. In addition, if such a provisioning is required, then it is to be studied whether and how the NSSP and URSP are updated to facilitate the migration of M4 media flow if required
2. Dynamic policy (over M5): In current 5G Media Streaming specifications TS 26.501 and TS 26.512, when UE needs activation of QoS based dynamic policy, it sends a M5 dynamic policy request to the 5GMS AF based on service access information it receives over M8 or M5. When a network slice condition, as described in clause 5.1 of TR 23700-41, is observed in which the network slice is underperforming and cannot meet the SLA, there is a real possibility that the requested QoS based dynamic policy cannot be applied in PDU session of current slice. In this case, given the solution of moving application flows to PDU Session in alternate slices as discussed in TR 23700-41 is an option. We need to study the following:
   1. Weather and how the alternate slice information is relayed to the UE for help with M5 dynamic policy operations
   2. Enhance existing M5 APIs in clause 11 of TS 26.512, and corresponding data model definitions, to facilitate moving of media flows to alternate slice

Based on above two gaps, two key issues – Key Issue #1: Service Provisioning and Key Issue #3: Moving media flows to alternate slices - presented in clause 4 are proposed to be included in TR 26941.

# **References**

[1] 3GPP TS 28.552: "Management and orchestration; 5G performance measurements".

[2] 3GPP TS 28.554: "Management and orchestration; 5G end to end Key Performance Indicators (KPI)".

[3] 3GPP TS 29.520: "5G System; Network Data Analytics Services; Stage 3".

[4] 3GPP TS 28.535: “Management and orchestration; Management services for communication service assurance; Requirements”

[5] “Commercializing 5G Network Slicing”, 5G Americas White Paper, https://www.5gamericas.org/wp-content/uploads/2022/07/Commercializing-5G-Network-Slicing-Jul-2022.pdf, July 2022

# **Proposal**

We propose 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”.

[2] 3GPP TR 26.804: "Study on 5G media streaming extensions".

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

[4] 3GPP TS 28.531: "Management and orchestration; Provisioning".

[5] GSM Association NG.116, “Generic Network Slice Template”,  
<https://www.gsma.com/newsroom/wp-content/uploads//NG.116-v6.0.pdf>

[6] 3GPP TR 23.700-40: “Study on enhancement of network slicing; Phase 2”

[7] 3GPP TS 23.501: "System architecture for the 5G System (5GS)".

[8] 3GPP TS 23.700‑99: "Study in Network slice capability exposure for application layer enablement (NSCALE)".

[9] 3GPP TS 23.435: "Procedures for Network Slice Capability Exposure for Application Layer Enablement Service".

[10] 3GPP TS 28.541: "Management and orchestration; 5G Network Resource Model (NRM); Stage 2 and stage 3".

[11] 3GPP TS 28.542: "Management and orchestration of networks and network slicing; 5G Core Network (5GC) Network Resource Model (NRM); Stage 1".

[12] 3GPP TS 28.532: "Management and orchestration; Generic management services".

[13] 3GPP TS 28.545: "Management and orchestration; Fault Supervision (FS)".

[14] 3GPP TS 28.546: "Management and orchestration of networks and network slicing; Fault Supervision (FS); Stage 2 and stage 3".

[15] 3GPP TS 23.502: "Procedures for the 5G System (5GS)".

[16] 3GPP TS 23.503: "Policy and charging control framework for the 5G System (5GS); Stage 2".

[17] 3GPP TS 23.434: "Service Enabler Architecture Layer for Verticals (SEAL); Functional architecture and information flows ".

[18] 3GPP TS 27.007: "AT command set for User Equipment (UE)".

[19] 3GPP TS 29.520: "5G System; Network Data Analytics Services; Stage 3".

[20] 3GPP TS 26501: "5G Media Streaming (5GMS); General description and architecture".

[21] 3GPP TS 26512: "5G Media Streaming (5GMS); Protocols".

[22] 3GPP TS 28.552: "Management and orchestration; 5G performance measurements".

[23] 3GPP TS 28.554: "Management and orchestration; 5G end to end Key Performance Indicators (KPI)".

[24] 3GPP TS 23.558: "Architecture for enabling Edge Applications".

[A] 3GPP TR 23700-41: "Enhancement of Network Slicing Phase 3".

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

## 6.1 Key Issue #1: Service Provisioning

### 6.1.1 Description

#### 6.1.1.1 Provisioning multiple Network Slices for media streaming

As introduced in clause 4.X of the present document, clause 5.1 of TR 23700-41 [A] studies a Key Issue on network slice service continuity. According to this key issue, a Network Slice or Network Slice instance can become overloaded, or the performance of the Network Slice may fall below the requirements of its SLA. A number of candidate solutions to this problem are discussed in [A], and all of them point to a procedure where an alternate slice is chosen and the application flows from the original slice are moved to the alternate slice.

In current 5G Media Streaming specification, a number of Policy Templates may be provisioned at reference point M1 using the Policy Template Provisioning API specified in clause 7.9 of TS 26.512 [21]. Along with policy information, application session context information identifying a single Network Slice and/or Data Network Name (DNN) is provided for each Policy Template, indicating to which slice and/or Data Network the template can be applied. To support migration of media streaming application flows because of an overloaded or underperforming Network Slice, enhancements to the Policy Template provisioning may be necessary to additionally provision information about alternative slices.

Open issues:

- Whether and how the 5GMS Application Provider provisions Policy Templates with alternative slice information.

- Whether and how the above enhancement to Policy Templates provisioning impacts the update of NSSP or URSP rules to facilitate the migration if required.

NOTE: Migration of media flows to different Network Slice is studied separately in clause 6.3

Assumptions:

- Slice creation and activation are out of scope of this Key Issue. The 5GMS Application Provider may perform offline negotiation with MNO OAM for slice creation and activation as described in clause 4.3.

**===== 3. CHANGE =====**

## 6.3 Key Issue #3: Moving media flows to other Network Slices

### 6.3.1 Description

#### 6.3.1.1 Migration of media streaming application flows between Network Slices due to dynamic policy

As introduced in clause 4.X of the present document, clause 5.1 of TR 23700-41 [A] studies a key issue on network slice service continuity. According to this key issue a Network Slice or Network Slice instance can become overloaded or the performance of the Network Slice may fall below the requirements of its SLA. This may impact the Dynamic Policy feature of 5G Media Streaming, the high-level procedures for which are defined in clause 5.8 of TS 26.501 [20].

As currently specified in TS 26.512 [21], once the Policy Templates are provisioned at the 5GMS AF:

- Dynamic policy invocation configuration information is made available to the Media Session Handler by the 5GMS AF using the M5 Service Access Information API specified in clause 11.2 of [21].

- When the UE wants a different network QoS policy for 5G Media Streaming, the Media Session Handler in the 5GMS Client sends a dynamic policy request to the 5GMS AF. Clause 11.5 of [21] describes the M5 Dynamic Policies API that allows the Media Session Handler to request a specific policy and charging treatment to be applied to a particular application data flow of a downlink or uplink media streaming session.

- When the Media Session Handler intends to activate a QoS-related Dynamic Policy Template, it includes a M5QoSSpecification property, as specified in clause 6.4.3.3 of [20]. For transient operational reasons, it is possible that the requested M5QoSSpecification cannot be satisfied by the Network Slice for which the Policy Template applies at the time of the dynamic policy invocation request for the reasons described in clause 5.1 of TR 23700-41 [A]. To satisfy the network QoS requirements of the target Policy Template, a potential solution is to extend the scope of the 5GMS architecture to allow the affected media flow to be migrated to a different PDU Session in a different Network Slice as described in [A].

Open issues:

- Whether and how the alternative slice information is relayed to the UE for help with M5 dynamic policy operations.

- Whether and how to extend existing M5 APIs in clause 11 of TS 26.512 [21], and corresponding data model definitions, to facilitate migration of affected media flows to a PDU Session in a different network slice.

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