**3GPP TSG SA WG4 Meeting #129-eS4-241678**

**Electronic Meeting, August 19 2024- August 23 2024**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *CR-Form-v12.3* | | | | | | | | |
| **Pseudo CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **TR 26.804** | **CR** | **CR0013** | **rev** | **-** | **Current version:** | **18.1.0** |  |
|  | | | | | | | | |
| *For* [***HE******LP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* | | | | | | | | |
|  | | | | | | | | |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***Proposed change affects:*** | UICC apps |  | ME |  | Radio Access Network |  | Core Network |  |

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | | | | | | | | | | |
| ***Title:*** | [FS\_AMD] Key issue description on dynamic policy with multi-access media delivery | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Samsung Electronics Co. Ltd., | | | | | | | | | |
| ***Source to TSG:*** | S4 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | FS\_AMD | | | | |  | ***Date:*** | | | 2024-08-20 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **B** |  | | | | | ***Release:*** | | | 19 |
|  | *Use one of the following categories:* ***F*** *(correction)* ***A*** *(mirror corresponding to a change in an earlier release)* ***B*** *(addition of feature),* ***C*** *(functional modification of feature)* ***D*** *(editorial modification)*  Detailed explanations of the above categories can be found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | | | | | | | | *Use one of the following releases: Rel-8 (Release 8) Rel-9 (Release 9) Rel-10 (Release 10) Rel-11 (Release 11) … Rel-17 (Release 17) Rel-18 (Release 18) Rel-19 (Release 19)  Rel-20 (Release 20)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | S4-241616 was discussed during SA4#129-e meeting, and a decision was made in MBS to add contents of this contribution to S4-241252 (CR 0013 against TR 26.804) an endorsed TR with initial draft on multi-access media delivery. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | Add a key issue description and study objectives for studying multi-access media delivery impacts on existing 5G media streaming dynamic policy support | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | One of the study topics will be incomplete | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 5.15.1 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  | **x** | Other core specifications | | | | TS/TR ... CR ... | | |
| ***affected:*** | |  | **x** | Test specifications | | | | TS/TR ... CR ... | | |
| ***(show related CRs)*** | |  | **x** | O&M Specifications | | | | TS/TR ... CR ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

|  |
| --- |
| CHANGE 1 |

## 5.15 Multi-access media delivery

### 5.15.1 Description

#### 5.15.1.1 Introduction

Media streaming applications traditionally obtain content from a single source over a single path within a network. This imposes several limitations:

1. Performance is constrained to that of the source and path chosen. Any limits on network bandwidth and latency between the client and that source are directly translated to the client’s achievable Quality of Service (QoS) and Quality of Experience (QoE).

2 Disruptions or degraded performance caused by the source in use or on any of the network links between the client and source can lead to poor user experience, often in the form of lower playback quality, rebuffering, or complete playback failure.

This Key Issue considers integration of different technologies into the 5G Media Streaming System that addresses these, and similar, issues by allowing media streaming applications to efficiently access content across multiple access networks. Different client implementations may then beneficially use the content on these multiple access networks either serially or concurrently, potentially guided by the service or network provider. Study of integration of different technologies into the 5G Media Streaming System is of relevance to address content provisioning, content hosting, impacts on user plane reference points M2 and M4, and on media session handling at reference point M5 as well as potential benefits in terms of quality and resource usage.

Challenges that multi-access architectures aim to address may include:

1. *Disruptions to QoS and QoE resulting from degraded performance or loss of availability of one or more network interfaces/access networks.* An example is disruption such as significant delays and loss of throughput caused during the process of switching from one access network to another as transport layer connections are migrated to new endpoint addresses on a different access network, or are destroyed and need to be re-established.

2. *Inability to efficiently utilise multiple network interfaces/access networks concurrently to achieve a target QoS or QoE.* An example is the inability of a UE to effectively utilise its connection with a secondary, reliable but high-cost, 5G access network in support of the primary, unreliable but inexpensive, access network using Wi-Fi.

#### 5.15.1.1 Multi-access using more than one USIM

A UE contains at most one USIM. Multiple UEs may be combined in a single device to form a composite terminal that is able to access more than one access network concurrently.

Editor's Note: Common scenario in media production where 5G modem units provide multiple SIM card slots intended for concurrent use. (Smartphone UEs with multiple slots aren't typically able to use more than one at the same time.) This Key Issue should also study what (if any) changes to the 5GMS System are needed to take advantage of this. Unlikely to be transparent to the 5GMS Client, requiring the use of multipath transport protocols, or applications specifically written to work with multiple paths.

#### 5.15.1.2 Multi-access using ATSSS

##### 5.15.1.2.1 General

Clause 5.32 of TS 23.501 [23501] describes ATSSS (Access Traffic Steering, Switching, and Splitting) an optional feature supported by the UE and 5G Core network for multi-access. Some of the key principles this feature defines that are relevant for our study are:

1. The ATSSS feature enables a *Multi-Access PDU Connectivity Service* allowing for the exchange of PDUs between the UE and a Data Network by simultaneously using one 3GPP access network and one non-3GPP access network via two independent N3/N9 tunnels between a PDU Session Anchor UPF (PSA UPF) and the RAN/AN.

NOTE 1: The limits on the number and type of access network refer to Release 18 and may differ in subsequent releases.

2. The Multi-Access PDU Connectivity Service is facilitated by a *Multi-Access PDU (MA PDU) Session* that may have User Plane resources on two access networks. In the context of the generalised media delivery architecture specified in TS 26.501 [15]:

- If conveyed over an MA PDU Session, the application flow between the Media Session Handler and the Media AF (e.g., 5GMS AF) at reference point M5 may use two different access networks.

- If conveyed over an MA PDU Session, the application flow between the Media Access Client (e.g., Media Player or Media Streamer) and the Media AS (e.g., 5GMS AS) at reference point M4 may use two different access networks.

3. The UE is supplied with policy rules ("ATSSS rules") by the network for deciding how to distribute uplink traffic across multiple access networks. Similarly, the UPF anchor is supplied with policy rules ("N4 rules") by the network for deciding how to distribute downlink traffic across the two N3/N9 tunnels and the two access networks. The network entity configuring ATSSS rules and N4 rules is the SMF. The SMF may map PCC rules from the PCF to create these ATSSS and N4 rules.

4. The UE indicates its support for ATSSS (steering functionalities and steering modes) in the *PDU Session Establishment Request* that is sent to request a new MA PDU Session.

5. If the UE requests a network slice instance, the same S-NSSAI is allowed to span both access networks.

NOTE 2: Support for QoS when PDUs are conveyed over a PDU Session belonging to a network slice that spans non-3GPP access network is unknown.

6. For QoS support, the same 5G QoS model used for conventional PDU Sessions also applies to MA PDU Sessions, i.e. QoS Flow is the finest granularity of QoS differentiation. However, QoS Flow is access-agnostic: the same network QoS applies to each of the different access network comprising the MA PDU Session, i.e. the same QoS is available across two different paths in different access networks. The network (SMF) may provide QoS rules to the UE via one access network that are used for both the 3GPP access network and non-3GPP access network.

- In the context of the generalised media delivery architecture, application flows at reference point M5 and/or M4 using a MA PDU Session may have similar network QoS as when they are transmitted via the 3GPP access network alone.

NOTE 3: Support for PDU Session QoS when PDUs are conveyed over a non-3GPP access network is unknown.

7. The network may provide Measurement Assistance Information to the UE and/or UPF to assist them in determining which measurements (packet round-trip time measurements, packet loss rate measurements) are to be performed before deciding how to distribute traffic across the two access networks.

8. The ATSSS rules provided to the UE by the network contain information about the type of steering to be used to distribute traffic across multiple access networks. This allows traffic to be steered, switched, and split across multiple access networks. From clause 5.32.8 of TS 23.501 [23501], the supported steering mechanism defined in this release are:

- *Higher-layer MPTCP (Multipath TCP) functionality* – The UPF provides MPTCP proxy functionality. Corresponding MPTCP functionality in the UE may communicate with the MPTCP proxy in the UPF to distribute and aggregate traffic across multiple access networks.

- *Higher-layer MPQUIC (Multipath-enabled QUIC) functionality* – The UPF provides MPQUIC proxy functionality. The corresponding MPQUIC functionality in the UE may communicate with the MPQUIC proxy in the UPF to distribute and aggregate traffic across multiple access networks.

- *ATSSS-LL (ATSSS Low-Layer) functionality* – The UPF allows steering, switching, and splitting of traffic across two access networks based on information from the IP layer and below.

9. The ATSSS rules provided to the UE by the network indicate which steering mode is to be applied to matching traffic for each Service Data Flow (SDF). The steering mode determines how the matching traffic is to be distributed across 3GPP and non-3GPP access networks. Supported steering modes in Release 18 include:

- *Active-Standby:* Used to steer matching SDF packets onto one access network (the "Active access") when this is available, and onto another (the "Standby access") when the Active access is unavailable.

- *Smallest Delay:* Matching SDF packets are steered to the access network with smallest packet round-trip time.

- *Load-Balancing:* Used to split the delivery of SDF packets between both the access networks if both of them are available.

- *Priority-based:* Used to steer SDF packets onto an access network with a higher priority.

*- Redundant:* Used to duplicate SDF packets on both access networks if both of them are available.

To support the operation of media delivery services specified in TS 26.501 [26501], TS 26.506 [26506], and TS 26.502 [26502] with multi-access, there is a need to first document clear potential issues to split, steer, and switch the M4 application flows of the above media delivery services based on methods specified in ATSSS architecture.

##### 5.15.1.2.2 Key Issue on dynamic policy with multi-access using ATSSS

TS 26.501[26501] and TS 26.510[26510] specify the stage-2 procedures and stage-3 data model definitions for dynamic policy feature in 5G Media Streaming. Specified as part of high-level procedure for service provisioning in clause 5.3.2 of TS 26.501[26501], when the dynamic policy feature is offered and selected, the 5GMSd Application Provider specifies a set of policies which can be invoked for the media streaming session. The data model for PolicyTemplate resource in specified in clause 8.7.3 of TS 26.510[26510]. The Media Session Handler becomes aware of the selected policies in the form of a list of valid Policy Template Ids.

When the Media Session Handler intends to activate dynamic policy for the media streaming session, the Media Session Handler sends a Dynamic Policy API request to the 5GMS AF. As specified in clause 5.7.3 of TS 26.501[26501], the request includes at least the Provisioning Session identifier, the Service Data Flow Description(s) and the Policy Template identifier to be applied to the described transport session. The details of the Dynamic Policy API are specified in clause 9.3 of TS 26.510[26510], and the data model for DynamicPolicy resource is specified in clause 9.3.3 of TS 26.510[26510].

The “applicationFlowBindings” property in the DynamicPolicy data model specifies the bindings between application flows at reference point M4 managed within the scope of the Dynamic Policy Instance and their network QoS requirements. This property includes three sub-properties that allow for specification of application flows to which the dynamic policy QoS specification is to be applied:

* componentIdentifier that references a particular service component in the Policy Template
* applicationFlowDescription which provides a specification of an application flow to be used by the 5G Core for application traffic identification purposes
* qosSpefication that provides network QoS requirements for the application flow(s) described by applicationFlowDescription

The *ApplicationFlowDescription* type is specified in clause 7.3.3.2 of TS 26.510[26510] which includes the following sub-properties:

* filterMethod: Of type *SdfMethod* (details in clause 7.3.4.2 of TS 26.510[26510]), provides details about how to identify packets belonging to this application flow
* packetFilter: Of type *IPPacketFilterSet* (details in clause 7.3.3.1 of TS 26.510[26510]), provides details about application flow in terms of packet header values
* domainName: Description of application flow in terms of FQDN of Media AS
* mediaType: Type of media carried by this application flow
* mediaTransportParameters: Of type ProtocolDescription (specified in clause 5.5.4.13 of TS 29.571[29571]), which describes set of media transport protocol parameters to be used by the 5G Core for the purpose of PDU Set identification and/or end of data burst detection on this application flow.

When the UE and the network agree to use a Multi-Access PDU Session as described in clause 5.15.1.2.1 of the present document for a 5G Media Streaming service, it is not clear how the dynamic policy feature specified in TS 26.501 [26501] and TS 26.510 [26510] is activated and implemented for application flows over multiple access networks.

Specifically, the following issues need to be studied:

- If M4 application flows are carried over two access networks, what does "activate dynamic policy with QoS requirements" mean – whether the requested network QoS is applicable to one, or more, or all access paths.

- Is it feasible to request QoS for a subset of access paths over specific access networks?

- Are any enhancements to the ApplicationFlowDescription type described in TS 26510 [26510] needed to support identification of M4 application flows over multiple access networks?

|  |
| --- |
| END OF CHANGES |