**3GPP TSG- Meeting #S4-250286**

**Geneva, Switzerland, 17th Feb – 21st Feb**

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| *CR-Form-v12.2* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
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|  |  | **CR** | **0026** | **rev** |  | **Current version:** |  |  |
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| *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)*.* | | | | | | | | |
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| ***Proposed change affects:*** | UICC apps |  | ME |  | Radio Access Network |  | Core Network | **X** |

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| ***Title:*** | Aspects to look into during future study on topic of multi-access media delivery | | | | | | | | | |
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| ***Source to WG:*** | Samsung Electronics Co. Ltd. | | | | | | | | | |
| ***Source to TSG:*** | S4 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | FS\_AMD | | | | |  | ***Date:*** | | |  |
|  |  | | | |  | |  | | |  |
| ***Category:*** | F |  | | | | | ***Release:*** | | |  |
|  | *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-16 (Release 16) Rel-17 (Release 17) Rel-18 (Release 18) Rel-19 (Release 19)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | The Rel-19 study on FS\_AMD is coming to an end. Clause 5.18 specifies study objectives, key issues and candidate solutions on multi-access media delivery. Some study aspects weren’t addressed sufficiently during this study. This contribution proposes FFS text so any future study in this area can look into these aspects. | | | | | | | | |
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| ***Summary of change:*** | | Add couple of gaps related to impact of multi-access media delivery on dynamic policy, network assistance, and network slicing procedures, and add some recommendation text for future work. | | | | | | | | |
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| ***Consequences if not approved:*** | | Feature for mullti-access media delivery will be incomplete. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 5.18.5, 5.18.7, 6.18, 7.3.4 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **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:*** | |  | | | | | | | | |

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

### 5.18.5 Gap analysis and requirements

#### 5.18.5.1 Multi-access downlink media streaming using CMMF

#### 5.18.5.2 Multi-Access media delivery using ATSSS

##### 5.18.5.2.1 Gaps in multi-access delivery path management

The following potential open issues are identified in the specific case where multipath delivery is not transparent to the 5GMS-Aware Application:

1. There is no specification related to informing the 5GMS-Aware Application of multiple paths when the UE is using ATSSS-based multipath media delivery.

##### 5.18.5.2.2 Gaps in Dynamic Policy procedures

Existing procedures for Dynamic Policies do not allow the 5GMS Client to request policy treatment over a specifc access network if the M4 flows are exchanged using multiple access networks. This is due to the fact that the currently specified data model parameters for dynamic policy procedures (as described in clause 5.18.1.4 of the present document) do not allow for identification of specific paths if multiple paths are possible between the UE and the 5GMS AS. Specifically, the sourceAddress and destinationAddress parameters of IPPacketFilterSet used in the Application‌Flow‌Description type (as described in clause 5.18.1.4 of this present document) both use the IP addresses of the Multi-Access PDU Session (as described in clause 5.18.1.3.1 of present document) assigned to the UE and UPF Steering Functionalities.

For identification of specific path, it is required that either the MPTCP link-specific multipath addresses or the MPQUIC link-specific multipath addresses be used, but these addresses are not routable via N6 (see clause 5.18.1.3.1 of present document), so these IP addresses are not candidates for use during the Dynamic Policy instantiation request that is to be sent to the 5GMS AF over N6.

This is an issue if one of the paths is a problematic path in a multipath environment as described in clause 5.18.1.3.2 of the present document. However, according to clause 5.32.4 of TS 23.501 [23], traffic splitting for GBR QoS Flows is not supported. So, if M4 media flows are transported as GBR QoS Flows, then traffic splitting of M4 media flows using ATSSS is not supported in this release, and the study needs to be revisited in a future release.

NOTE: The Rel-18 ATSSS specification does not support traffic splitting for GBR QoS Flows between 3GPP and Non-3GPP accesses. The ATSSS specification work in future releases is to be monitored, and referenced here when there is an update.

##### 5.18.5.2.3 Gaps in Network Assistance procedures

Clause 4.0.5 of TS 26.501 [15] describes the high-level procedure for Network Assistance. As specified in that clause Network Assistance enables the 5GMS Client to interrogate or manipulate the network Quality of Service for an ongoing media streaming session. Clause 5.4.4 of TS 26.510 [108] specifies the procedures used by a 5GMS Client to request a bit rate recommendation and a delivery boost respectively from the Media AF.

For both these requests, it is unclear whether the5GMS Client is able to request, or receive, Network Assistance over a specific access network when the application flows at reference point M4 are using the Multi-Access PDU Session spanning multiple access networks as described in clause 5.18.1.3 of the present document.

##### 5.18.5.2.4 Gaps with network slicing

As described in clause 5.18.1.3 of the present document, if the UE requests a network slice instance with the Multi-Access PDU Session, the same S-NSSAI is allowed to span both access networks. Clause 5.15.19 of TS 23.501 [23] specifies support for Network Slice Replacement, a feature that is used to temporarily replace an S-NSSAI with an Alternative S-NSSAI when the originally selected S-NSSAI becomes unavailable or congested in the 5G network. There is no specification text in clause 5.15.19 of TS 23.501 [23] describing the impact of Network Slice replacement on a Multi-Access PDU Session.\* \* \* \* Second change \* \* \* \*

### 5.18.7 Summary and conclusions

Multi-access media delivery enables media streaming applications to efficiently access content over multiple access networks. This Key Issue has examined existing specification relating to the ATSSS (Access Traffic Steering Switching and Splitting) architecture in TS 23.501 [23] and TS 23.502 [24] to identify its impact on 5GMS. Topics relating to application awareness and influence on multi-access delivery, potential enhancements to dynamic policy feature of 5GMS to support multiple access paths, and network assistance with multi-access delivery have been studied. The Key Issue has documented collaboration scenarios and the mapping of the ATSSS architecture into the 5GMS architecture.

The MPTCP and MPQUIC link-specific multipath IP addresses are not routable via N6 as of current release, and therefore identification of specific paths for any 5G Media Streaming procedures is not supported. Further, traffic splitting for GBR QoS Flows is not supported. If M4 media flows are transported as GBR QoS Flows, then traffic splitting of M4 media flows using ATSSS is not supported in this release, and the study is to be revisited in a future release.

It is recommended that:

1. An informative annex is added to TS 26.501 [23] documenting:

a. A brief description of multi-access media delivery, based on clause 5.18.1 of the present document.

b. The mapping of the ATSSS architecture into the 5GMS architecture, as described in clause 5.18.3.2 of the present document.

2. Changes to the Configuration Settings API and to the Dynamic Status Information API as described in clause 5.18.6.2 of the present document are implemented in TS 26.510 [108] to allow for application configuration and status information exchange for multi-access media delivery.

3. A future study on the topic of multi-access media delivery looks into the following aspects:

a. Whether future specification work on ATSSS supports traffic splitting for GBR QoS Flows between 3GPP and non-3GPP accesses. If it is supported, study the impact on splitting M4 media flows if they are transported as GBR QoS Flows as described in clause 5.18.5.2.2 of the present document.

b. Impact of multi-access media delivery using ATSSS architecture on UE multi-path management, Dynamic Policy, Network Assistance, and network slicing procedures, as described in clause 5.18.5.2 of the present document.

c. Whether and how a closer alignment with the study on media delivery from multiple service endpoints/locations in clause 5.19 of the present document is required.\* \* \* \* Third change \* \* \* \*

## 6.18 Multi-access media delivery

Multi-access media delivery enables media streaming applications to efficiently access content over multiple access networks. This Key Issue has examined existing specification relating to the ATSSS (Access Traffic Steering, Switching and Splitting) architecture in TS 23.501 [23] and TS 23.502 [24] to identify its impact on 5GMS. Topics relating to application awareness and influence on multi-access delivery, potential enhancements to dynamic policy feature of 5GMS to support multiple access paths, and network assistance with multi-access delivery have been studied. The Key Issue has documented collaboration scenarios and the mapping of the ATSSS architecture into the 5GMS architecture.

Based on the conclusions, following are recommended for stage-2:

- An informative annex is added to TS 26.501 [15] documenting:

a. A brief description of multi-access media delivery, based on clause 5.18.1 of the present document.

b. The mapping of the ATSSS architecture into the 5GMS architecture, as described in clause 5.18.3.2 of the present document.

Based on the conclusions, following are recommended for stage-3:

- Changes to the Configuration Settings API and to the Dynamic Status Information API as described in clause 5.18.6.2 of the present document are implemented in TS 26.510 [108] to allow for application configuration and status information exchange for multi-access media delivery.

It is recommended that future specification work on ATSSS in TS 23.501 [23] and TS 23.502 [24] is to be monitored to further study traffic splitting of M4 flows across multiple access networks.

It is recommended that future study on this topic looks into the impact of media delivery using ATSSS architecture on UE multi-access path management, Dynamic Policies, Network Assistance, and network slicing procedures as described in clause 5.18.7 of the present document.

\* \* \* \* Fourth change \* \* \* \*

### 7.3.4 Recommendations for further study arising from version 19

It is recommended to continue the study of additional extensions to 5G Media Streaming. Candidate topics based on the present document are:

1. For *Uplink Streaming* as introduced in clause 5.5 and based on the conclusions in clause 6.5, for the application of uplink 5G Media Streaming for media production and contribution be studied in more detail based on the information from 5G-MAG in clause 5.5.1.5. Specific topics are:

a. Network Assistance as elaborated in clause 5.5.1.5.2,

b. QoE metrics reporting as elaborated in clause 5.5.1.5.3,

c. Consumption reporting as elaborated in clause 5.5.1.5.4,

d. Traffic steering and multipath as elaborated in clause 5.5.1.5.5.

2. For *Common Media Client Data (CMCD)* as introduced in clause 5.16 and based on the conclusions in clause 6.16:

a. To monitor the work in CTA WAVE on potential extensions of CMCD, and potentially study how these extensions would be beneficial for 5G Media Streaming.

b. To further study the usage of CMCD when 5GMS is deployed over MBS and/or MBMS.

c. To further study the aggregation of different reports (Metrics, CMCD, Consumption) in the 5GMS AF and the potential consolidation of information into a single data structure when exposed to the 5GMS Application Provider.

3. For *Common server-and network-assisted streaming* as introduced in clause 5.17 and based on the conclusions in clause 6.17

- To continue studying Common Media Server Data (CMSD) and its potential benefits in the context of 5G Media Streaming.

4. For *Media delivery from multiple service endpoints/locations* as introduced in clause 5.19 and based on the conclusions in clause 6.19:

- To verify Content Preparation Template signalling and implementation within 5GMS specifications (item 3 of clause 5.19.7). This verification may be conducted outside 3GPP.

5. For *Multi-access media delivery* as introduced in clause 5.18 and based on the conclusions in clause 6.18:

- To monitor future specification work on ATSSS in TS 23.501 [23] and TS 23.502 [24] to further study traffic splitting of M4 flows across multiple access networks.

- To study the impact of multi-access media delivery using the ATSSS architecture on UE multipath connection management, Dynamic Policies, Network Assistance and network slicing procedures.

- To study whether and how a closer alignment with the study on media delivery from multiple service endpoints/locations (see clause 5.19) is required.

6. For *Optimising modem usage for media streaming* in clause 5.20 and based on the conclusions in clause 6.20:

- To identify the current limitations and assess the potential of candidate solutions of device-level media resource management with network-assisted scheduling for media delivery.

7. For *DASH/HLS Interoperability* in clause 5.21 and based on the conclusions in clause 6.21:

- To continue studying this Key Issue in future versions of the present document.

- To take into account the expected revised version of CTA-5005A [147] in such a future study.

8. For *QUIC-based Media Delivery* as introduced in clause 5.24 and based on the conclusions in clause 6.24 to further study:

a. The standardized definitions of QUIC client and server APIs and their availability on the market.

b. The standardized definitions of WebTransport client and server APIs and their availability on the market.

c. The fragmentation of QUIC implementations (both on the client and server side) and their performance for segmented media delivery.

d. Evaluation of the identified candidate technologies with regards to QoE metrics (start-up delay, stalling events, etc.).

e. The impact of reporting qlog metrics via the downlink interface (M4) to the UE (bidirectional streams).

9. For *Secure Communication of Network Properties (SCONE-PRO) and 5G Media Streaming* as introduced in clause 5.25 and based on the conclusions in clause 6.25:

- To study the potential impact of *Secure Communication of Network Properties (SCONE-PRO)* as defined in IETF on 5G Media Streaming.

10. For *Dynamic content generation from multiple sources* as introduced in clause 5.26 based on the conclusions in clause 6.26:

- To further study support for ReAP and configuration of REaP in 5GMS.

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