## 3GPP TSG SA WG4 Meeting #130S4-242216r01

**Orlando, FL, US 18 - 22 Nov 2024 (revision of S4-242216)**

**Source: Qualcomm Incorporated, BBC, China Mobile Com. Corporation, Dolby France SAS, NTT, Orange, Huawei Technologies Co Ltd., Comcast, XGN, Ericsson LM, Tencent, ATEME, AT&T, Samsung Electronics Co. Ltd., China Unicom, Telecom Italia**

**Title: Draft New Work Item on Architectural Updates for Advanced Media Delivery**

**Document for: Agreement**

**Agenda Item: 17**

3GPP™ Work Item Description

Information on Work Items can be found at <http://www.3gpp.org/Work-Items>
See also the [3GPP Working Procedures](http://www.3gpp.org/specifications-groups/working-procedures), article 39 and the TSG Working Methods in [3GPP TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm)

Title: New Work Item on Architectural Updates for Advanced Media Delivery

Acronym: AUAMD

Unique identifier: tbd

Potential target Release: Rel-19

# 1 Impacts

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Affects: | UICC apps | ME | AN | CN | Others (specify) |
| Yes |  | X |  | X |  |
| No | X |  | X |  | X |
| Don't know |  |  |  |  |  |

# 2 Classification of the Work Item and linked work items

## 2.1 Primary classification

This work item is a …

|  |  |
| --- | --- |
|  | Study  |
|  | Normative – Stage 1 |
| X | Normative – Stage 2 |
|  | Normative – Stage 3 |
|  | Normative – Other\* |

**\* Other = e.g. testing**

## 2.2 Parent Work Item

|  |
| --- |
|  Parent Work / Study Items  |
| Acronym | Working Group | Unique ID | Title (as in 3GPP Work Plan) |
| n/a |  |  |  |

### 2.3 Other related Work Items and dependencies

|  |
| --- |
| Other related Work /Study Items (if any) |
| Unique ID | Title | Nature of relationship |
| 840001 | 5GMS3 5G Media Streaming stage 3 (5GMS3) | Addressed stage-3 in 5G Media Streaming by updating TS 26.247 as well as new specs in TS 26.511, TS 26.512, and TS 26.117. |
| 900029 | Study on 5G media streaming extensions (FS\_5GMS\_EXT) | Studied the current limitation of 5G Media Streaming architecture and documented possible extensions in TR 26.804. |
| 870014 | Feasibility Study on Multicast Architecture Enhancements for 5G Media Streaming (FS\_5GMS\_Multicast) | Identified and evaluated potential enhancements to the 5G Media Streaming Architecture to provide multicast-broadcast media streaming services in TR 26.802. |
| 960047 | 5G Media Streaming Architecture Phase 2 (5GMSA\_Ph2) | Addressed stage-2 of extensions to 5G Media Streaming Architecture |
| 1000018 | 5G Media Streaming Protocols Phase 2 (5GMS\_Pro\_Ph2) | Addressed stage-3 in 5G Media Streaming by updating TS 26.512 and creating TS 26.510 |
| 940008 | 5G Multicast-Broadcast Protocols | Initial work item to provide protocols for MBS |
| 960048 | Study on Media Streaming aspects of Network Slicing Phase 2 (FS\_MS\_NS\_Ph2) | Study to conclude on Media Streaming aspects of Network Slicing |
| 1010032 | Study on Extended Reality and Media service (XRM) Phase 2 (FS\_XRM\_Ph2) | findings related to Media over QUIC may be relevant for the ongoing study in SA2 |
| 1030006 | Study on Advanced Media Delivery (FS\_AMD) | Preparatory study for this normative work. |

# 3 Justification

TS 26.501 defines the 5GMS architecture, call flows, and procedures. TS 26.512 defines the 5G Media Streaming protocols. In the 5GMS\_Ph2 work item, extensions to 5G Media Streaming architecture are provided. In the 5GMS\_Pro\_Ph2, extensions to 5G Media Streaming Protocols were provided and generalized the topic of media delivery by providing TS 26.510. In addition, for MBS, the User Service architecture was developed in TS 26.502 and MBS Protocols are defined in TS 26.517. It is also worth noting that 5G-MAG has defined reference implementations of both 5G Media Streaming and MBS. The implementation provides feedback for potential bugfixes.

However, mobile media delivery is as important as never before with everlasting growth of traffic and new functionalities provided by third-party service providers. Several potential improvement areas and potential extensions have been identified and should be studied further.

The primary focus of this Work Item is the delivery of segmented media objects in the media plane, i.e. at reference points M2, M4 and M7 of the Media Delivery architecture. Based on the outcome of the study on FS\_AMD, this documents updates to stage-2 specifications.

TR 26.802 has been updated with relevant key issues and conclusions and for the following issues, stage-2 work has been recommended in clause 8.4.2 of TR 26.802:

1. For *Key Issue #8: In-session unicast repair for MBS Object Distribution* as introduced in clause 5.9 and based on the conclusions in clause 5.9.7 to address Gap#1 in clause 5.9.5 by the candidate solution in clause 5.9.6.

2. For *Key Issue #9: MBS User Service and Delivery Protocols for eMBMS* as introduced in clause 5.10 and based on the conclusions in clause 5.10.6.

3. For *Key Issue #10: Selected MBMS Functionalities not supported in MBS* as introduced in clause 5.11 and based on the conclusions in clause 5.11.4.

TR 26.804 has been updated with relevant key issues and conclusions in clause 7.3.1, stage-2 work has been recommended:

4. For *Common Client Metadata* as introduced in clause 5.16 and based on the conclusions in clause 6.16.

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

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

7. For *distributing encrypted and high-value content* as introduced in clause 5.10 and based on the conclusions in clause 6.10.

8. For *Improved QoS support* for Media Streaming services as introduced in clause 5.23 based on the conclusions in clause 6.23.

In addition, the Study on Media Streaming aspects of Network Slicing Phase 2 (FS\_MS\_NS\_Ph2) concluded in TR 26.941 for stage-2 to be implemented into TS 26.501.

9. The stage-2 alignment changes described in clause 6.1.3 of TR 26.941 to support policy provisioning for a plurality of Network Slices and/or Data Networks

10. Use cases and collaboration scenarios for network slicing documented in clauses 5.3 and 5.4 of TR 26.941 be included in an informative annex.

11. Key issue description and candidate solution on bootstrapping application invocation on a Network Slice is included as informative annex

The work item addresses the updates recommended above.

# 4 Objective

The objective of this work item is to address the recommendations for stage-2 extensions of the studies FS\_AMD and FS\_MS\_NS\_Ph2 in the relevant specifications, primarily TS 26.501 and TS 26.502. Specifically, the following objectives are identified:

1. Provide relevant extensions to TS 26.502 to extend the MBS User Service architecture:

a. For *Key Issue #8: In-session unicast repair for MBS Object Distribution* as introduced in clause 5.9 of TR 26.802:

i. Define a new reference point in TS 26.502 between the MBSTF and the MBS AS.

ii. Document call flows and procedures for both post-session and in-session unicast repair.

b. For *Key Issue #9: MBS User Service and Delivery Protocols for eMBMS* as introduced in clause 5.10 of TR 26.802 based on the conclusions in clause 5.10.6:

i. Fully specify support for the Joint BM-SC and MBSF Functionality. For this purpose, the gap identified in clause 5.10.4.1 of the present document needs to be addressed by documenting additional procedures and baseline parameters as required in TS 26.502 and permitting the signalling of MBMS sessions.

ii. Document in an informative annex to TS 26.502 the deployment architectures, client architectures and high-level call flows in clauses 5.10.2.3 and 5.10.2.4.

c. For *Key Issue #10: Selected MBMS Functionalities not supported in MBS* as introduced in clause 5.11 of TR 26.802:

i. Add the necessary functional extensions and call flows to support the Generic Application Service as defined in clause 7.6 of TS 26.346 based on the discussion in clause 5.11.3.2,

ii. Add the necessary functional extensions and call flows to support partial file handling as defined in clause 7.9 of TS 26.346 based on the discussion in clause 5.11.3.3,

iii. Add the necessary functional extensions and call flows to support reporting of metrics based on the discussion in clause 5.11.3.4,

iv. Add the necessary functional extensions and call flows to support time Synchronization as defined in TS 26.346 in clause 4.6 based on the discussion in clause 5.11.3.6.

2. Provide relevant extensions to the Stage 2 5G Media Streaming architecture defined in TS 26.501:

a. for *Common Media Client Data (CMCD)* as introduced in clause 5.16 of TR 26.804:

i. Functional changes to the 5GMSd AF as outlined in clause 5.16.6.1.8,

ii. Functional changes to the 5GMSd AS as outlined in clause 5.16.6.1.9,

iii. Functional changes to the Media Player as outlined in clause 5.16.6.1.10,

iv. Functional changes to the Media Session Handler for downlink media streaming only as outlined in clause 5.16.6.1.11

b. for *Multi-access media delivery* as introduced in clause 5.18 of TR 26.804:

i adding an informative annex is added to TS 26.501 documenting:

1. A brief description of multi-access media delivery, based on clause 5.15.1 of the present document.

2. The mapping of the ATSSS architecture into the 5GMS architecture, as described in clause 5.15.3.2 of the present document.

c. For *Media delivery from multiple service endpoints/locations* as introduced in clause 5.19 of TR 26.804:

i. Multi-source media streaming collaboration scenarios and associated call flows are documented (item 1 in clause 5.19.7).

ii. Reference point M10 is brought into scope of 5GMS for the purposes of content preparation chaining and media delivery between provisioned content distributions (item 4 in clause 5.19.7).

iii. Update the description of the Content Hosting Configuration to describe the ability of the 5GMSd AF to provision Content Distributions in hierarchical or peer-to-peer configurations (item 4 of clause 5.19.7).

iv. Document the capability to signal information to the 5GMSd Client that is required to deliver media from multiple content sources/endpoints using the Media Entry Point (item 6 in clause 5.19.7).

v. Define the requirements and functions necessary for a Media Player and the equivalent network functions in the AS to be interoperable within the 5GMS System (item 7 in clause 5.19.7).

vi. Clarify that the Media Player used for the purposes of multi-source/service location media delivery natively supports the multi-source/service location delivery approach in use (item 8 in clause 5.19.7).

vii. Define a new reference point between a new External Access Client function located with the Media Player and a non-3GPP third-party provider content hosting function or 5GMSd Application Provider for the purposes of communicating user plane information between the two functions (item 10 in clause 5.19.7).

d. For *distributing encrypted and high-value content* as introduced in clause 5.10 of TR 26.804:

i. Functional updates to the definition of the 5GMS AS to support:

1. Ingest, delivery, and contribution of encrypted content

2. Content preparation tasks for:

3. Decrypting content ingested at reference point M2d.

4. (Re-)encrypting content prior to distribution at reference point M4d.

ii. Updates to the definitions of reference points to support:

1. Carriage of Content Protection information at reference point M2d.

2. Delivery of Content Protection information in presentation manifests at reference point M4d.

e. For *Improved QoS support for Media Streaming services* as introduced in clause 5.23 of TR 26.804:

i. Integrate *ECN marking for L4S* into the architectures, high-level call flows and collaboration scenarios for both 5GMSd and 5GMSu.

ii. Integrate the *QoS monitoring feature* into the architectures, high-level call flows and collaboration scenarios for both 5GMSd and 5GMSu.

f. for *Media Streaming aspects of Network Slicing* as concluded in TR 26.941:

i. Stage-2 alignment changes described in clause 6.1.3 of TR 26.941 to support policy provisioning for a plurality of Network Slices and/or Data Networks.

ii. Use cases and collaboration scenarios for network slicing documented in clauses 5.3 and 5.4 of TR 26.941 be included in an informative annex.

ii. Key issue description and candidate solution on bootstrapping application invocation on a Network Slice is included as informative annex.

4. For key topic address the following aspects:

a. Address extensions to the relevant architecture, if needed.

b. Update functional description of existing architectural components.

c. Create new call flows and/or extend existing call flow flows to address the features.

e. Identify the relevant information to be exchanged on the impacted reference points.

5. Coordinate work with other 3GPP groups e.g. SA2, SA3, SA5, SA6, CT3, CT4 and others as needed.

6. Coordinate work with external organizations such as SVTA (primarily the DASH-IF WG), CTA WAVE, ISO/IEC JTC29 WG3 (MPEG Systems), 5G-MAG, DVB and/or IETF, as needed.

# 5 Expected Output and Time scale

|  |
| --- |
| New specifications {One line per specification. Create/delete lines as needed} |
| Type  | TS/TR number | Title | For info at TSG#  | For approval at TSG# | Rapporteur |
|  |  |  |  |  |  |

|  |
| --- |
| Impacted existing TS/TR {One line per specification. Create/delete lines as needed} |
| TS/TR No. | Description of change  | Target completion plenary# | Remarks |
| 26.501 | Architectural Updates for Advanced Media Delivery | SA#107(Mar 24) | Individual CRs for each of the key topics may be provided. |
| 26.502 | Architectural Updates for Advanced Media Delivery | SA#107(Mar 24) | Individual CRs for each of the key topics may be provided. |

# 6 Work item Rapporteur(s)

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# 7 Work item leadership

SA4

# 8 Aspects that involve other WGs

SA2 for architectural discussions.

SA3 for security related discussions.

CT3/CT4 for network reference points.

# 9 Supporting Individual Members

Editor’s Note: Supporting Individual Members are expected to be added based on the study outcome.

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| **Supporting IM name** |
| AT&T |
| ATEME |
| BBC |
| China Mobile Com. Corporation |
| China Unicom |
| Comcast |
| Dolby France SAS |
| ~~EBU~~ |
| Ericsson LM |
| Huawei Technologies Co Ltd. |
| ~~InterDigital Communications~~ |
| ~~Lenovo~~ |
| NTT |
| Orange |
| Qualcomm Incorporated |
| ~~Rohde &Schwarz~~ |
| Samsung Electronics Co. Ltd. |
| ~~Sony Europe B.V.~~ |
| ~~SWR~~ |
| Telecom Italia |
| Tencent |
| ~~Xiaomi~~ |
| ~~ZTE~~ |