**3GPP TSG- Meeting #**

**, , - revision of S4-232009**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *CR-Form-v12.2* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  |  | **CR** |  | **rev** |  | **Current version:** |  |  |
|  | | | | | | | | |
| *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 | **X** | Radio Access Network |  | Core Network | **X** |

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | | | | | | | | | | |
| ***Title:*** |  | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** |  | | | | | | | | | |
| ***Source to TSG:*** |  | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** |  | | | | |  | ***Date:*** | | |  |
|  |  | | | |  | |  | | |  |
| ***Category:*** |  |  | | | | | ***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:*** | | It was identfiied that RTC has many commonalities with 5GMS and hence a generalized Media Architecture representation is preferred. This alignment is documented. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | Integration of 5GMS in Media Architecture  Bug fixes | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | Stage-3 specifications are unclear. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 2, 3.3, 4.1, 4.1.2 (new), 4.2.3 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **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 =====

# 2 References

[X] 3GPP TS 26.506: "5G Real-time Media Communication Architecture".

# ===== CHANGE =====

## 3.3 Abbreviations

For the purposes of the present document, the abbreviations given in TR 21.905 [1] and the following apply. An abbreviation defined in the present document takes precedence over the definition of the same abbreviation, if any, in TR 21.905 [1].

5GC 5G Core Network

5GMS 5G Media Streaming

5GMSd 5G Media Streaming downlink

5GMSu 5G Media Streaming uplink

5GS 5G Systems

AF Application Function

ABR Adaptive Bit Rate

AMF Access and Mobility Function

API Application Programming Interface

App Application

AS Application Server

CAPIF Common API Framework

CDN Content Delivery Network

DASH Dynamic and Adaptive Streaming over HTTP

DN Data Network

DNAI Data Network Application Identifier

DNN Data Network Name

DRM Digital Rights Management

EPC Evolved Packet Core

EPS Evolved Packet System

EUTRAN Evolved Universal Terrestrial Radio Access Network

FLUS Framework for Live Uplink Streaming

FQDN Fully-Qualified Domain Name

GPU Graphics Processing Unit

GSM Global System for Mobile communication

HPLMN Home Public Land Mobile Network

HTTP HyperText Transfer Protocol

HTTPS HyperText Transfer Protocol Secure

LTE Long-Term Evolution

MBMS Multimedia Broadcast Multicast System

MNO Mobile Network Operator

MPD Media Presentation Description

MSISDN Mobile Station International Subscriber Directory Number

NA Network Assistance

NEF Network Exposure Function

NR New Radio

NSMF Network Slice Management Function

NSSAI Network Slice Selection Assistance Information

NSSP Network Slice Selection Policy

OAM Operations, Administration and Maintenance

OTT Over-The-Top

PCC Policy and Charging Control

PCF Policy and Charging Function

PDU Packet Data Unit

PSS Packet-switched Streaming Service

RAN Radio Access Network

RTC Real-Time Communication

SBA Service based Architecture

SLA Service Level Agreement

TCP Transmission Control Protocol

UPF User Plane Function

URL Unique Resource Identifier

URSP UE Route Selection Policy

# ===== CHANGE =====

## 4.1 General service architecture

### 4.1.1 Definition of 5G Media Streaming architecture

The overall 5G Media Streaming Architecture is shown in Figure 4.1.1-1 below.



NOTE: The functions indicated by the yellow filled boxes are in scope of stage 3 specifications for 5GMS. The functions indicated by the grey boxes are defined in 5G System specifications. The functions indicated by the blue boxes are neither in scope of 5G Media Streaming nor 5G System specifications.

Figure 4.1.1-1: 5G Media Streaming within the 5G System

The 5GMS Application Provider uses 5GMS for streaming services. It provides a 5GMS Aware-Application on the UE to make use of 5GMS Client and network functions using interfaces and APIs defined in 5GMS.

The architecture in Figure 4.1.1-1 represents the specified 5GMS functions within the 5G System (5GS) as defined in TS 23.501 [2]. Three main functions are defined:

- **5GMS AF:** An Application Function as defined in TS 23.501 [2] clause 6.2.10, dedicated to 5G Media Streaming.

- **5GMS AS:** An Application Server dedicated to 5G Media Streaming.

- **5GMS Client:** A UE internal function dedicated to 5G Media Streaming. The 5GMS Client is a logical function and its subfunctions may be distributed within the UE according to implementation choice.

5GMS AF and 5GMS AS are Data Network (DN) functions and communicate with the UE via N6 as defined in TS 23.501 [2].

Functions in trusted DNs, e.g. a 5GMS AF in the Trusted DN, are trusted by the operator's network as illustrated in Figure 4.2.3-5 of TS 23.501 [2]. Therefore, such AFs may directly communicate with the relevant 5G Core functions.

Functions in external DNs, e.g. a 5GMS AF in the External DN, may only communicate with 5G Core functions via the NEF using N33.

The present document specifies the according network architectures for 5GS. The 5GMS architecture may be applied to an EPS although such an application is not specified in the present document and is left to the discretion of deployments and implementations.

The 5G Media Services Architecture maps the overall high-level architecture shown in Figure 4.1-1 above to the general architecture shown in Figure 4.1-2 below.



NOTE: The 5GMS Client in the UE is depicted in the form of Media Session Handler and Media Stream Handler constituent functions which expose APIs to one another in the same way that those APIs are exposed to 5GMS-Aware Applications. This UE architecture is not applicable generally; it is just as valid to implement a 5GMS Client that does not expose interfaces M6 and M7 within the 5GMS Client. It is also valid for a 5GMS Client inside a UE to be completely self-contained, such that all functionality typically implemented in the 5GMS-Aware Application is embedded in the UE and thus interfaces M6 and M7 are not exposed at all.

Figure 4.1.1-2: 5G Media Streaming general architecture

The remainder of the present document specifies stage 2 aspects of the media streaming functional entities shown in the general architecture of Figure 4.1.1-2.

This architecture specification addresses two main scenarios as concerns each individual media streaming operation:

- **Downlink streaming:** The network is the origin of the media and the UE acts as the consumption device.

**- Uplink streaming:** The UE is the origin of the media and the network acts as the consumption entity.

The functional entities and interfaces of the media streaming general architecture need to be elaborated with specificities relating to downlink and uplink streaming. For this purpose, corresponding descriptions add the suffix "d" for downlink and "u" for uplink functionality as appropriate in each case.

Clause 4.2 introduces the 5G Unicast Downlink Media Streaming architecture.

Clause 4.3 introduces the 5G Unicast Uplink Media Streaming architecture.

# ===== CHANGE =====

### 4.1.2 Generalized Media Delivery architecture

#### 4.1.2.1 Generalized Media Delivery in the 5G System

This clause defines a generalized Media Delivery architecture of which the architecture for 5G Media Streaming (5GMS) defined elsewhere in the present document is one possible realisation. In case of any misalignment between the two, the 5GMS architecture has precedence over this generalised architecture.

Due to the similarity of the 5GMS architecture (as defined in the present document) to the architecture for Real-Time Communication (RTC) defined in TS 26.506 [X], the RTC functions and 5GMS functions may share or may make use of many common functionalities for both media session handling and media delivery. A generalized Media Delivery architecture that integrates 5GMS and RTC functionality in the 5G System is defined in figure 4.1.2.1-1.

NOTE: Full integration of 5GMS and RTC is not addressed in the present document.



Figure 4.1.2.1-1: Generalized Media Delivery architecture within the 5G System

In this representation:

- The *Media Application Provider* plays the role of the 5GMS Application Provider.

- The *Media-aware Application* plays the role of the 5GMS-Aware Application.

- The 5GMS AF is one possible realisation of the general Media AF.

- The 5GMS AS is one possible realisation of the general Media AS.

- The 5GMS Client is part of the general Media Client.

#### 4.1.2.2 Reference architecture for Media Delivery

A functional description with additional details as well as reference points is provided below, as illustrated in figure 4.1.2.2-1.



NOTE 1: Exposed APIs are named in *italics*.

NOTE 2: If the Media Client is deployed as a monolithic functional block, it may choose not to expose interfaces externally at reference point M11.

Figure 4.1.2.2-1: Generalized 5G Media Delivery architecture

#### 4.1.2.3 Network Functions and UE entities

Functional definitions may be generalized as follows:

- **Media AF:** An Application Function as defined in clause 6.2.10 of TS 23.501 [2] dedicated to Media Delivery.

- **Media AS:** An Application Server dedicated to Media Delivery.

- **Media Client:** A UE internal function dedicated to Media Delivery comprising:

- **Media Session Handler:** An entity on the UE that communicates with the Media AF in order to establish, control and support the delivery of a media session.

- **Media Access Function:** An entity on the UE that communicates with the Media AS in order to access and deliver media content. The media access function for example may be further sub-divided into content delivery protocols, codecs, media types and metadata representation.

- **Media-aware Application:** An application entity on the UE that makes use of 3GPP-defined APIs to invoke the Media Session Handler and/or the Media Access Function in order to support Media Delivery.

NOTE: An application (e.g., a web browser application) that does not invoke either the Media Session Handler or the Media Access Function using 3GPP-defined APIs is not considered a Media-aware Application and is not mapped into the generalized Media Delivery reference architecture.

Table 4.1.2.3-1 Mapping of 5GMS functions to generalized Media Delivery architecture

|  |  |  |  |
| --- | --- | --- | --- |
| Generalized media architecture function | | 5GMSd function | 5GMSu function |
| Media AF | | 5GMSd AF | 5GMSu AF |
| Media AS | | 5GMSd AS | 5GMSu AS |
| Media Client | | 5GMSd Client | 5GMSu Client |
|  | Media Session Handler | Media Session Handler | |
|  | Media Access Function | Media Stream Handler (Media Player) | Media Stream Handler (Media Streamer) |
| Media Application Provider | | 5GMSd Application Provider | 5GMSu Application Provider |
| Media-aware Application | | 5GMSd-Aware Application | 5GMSu-Aware Application |

#### 4.1.2.4 Reference points

The following reference points are defined for Media Delivery:

**M1**: Reference point between the Media Application Provider and the Media AF for the provisioning of Media Delivery.

**M2**: Reference point between the Media Application Provider and the Media AS for the purposes of ingesting media into the Media AS or egesting media from the Media AS.

**M3**: Reference point between the Media AF and the Media AS for the purposes of Media AS configuration and/or for media session handling in relation to Media Delivery.

**M4**: Reference point between the Media AS and the Media Access Function in the UE for the purpose of downlink transport of media from the Media AS to the Media Access Function ("content distribution") or uplink transport of media from the Media Access Function to the Media AS ("content contribution").

**M5**: Reference point between the Media AF and the Media Session Handler in the Media Client for the purpose of media session handling in relation to Media Delivery.

**M6**: Reference point between the Media-aware Application and the Media Session Handler for the purpose of configuring the Media Session Handler.

**M7**: Reference point between the Media-aware Application and the Media Access Function for the purpose of media access control.

**M8**: Reference point between the Media-aware Application and the Media Application Provider.

NOTE 1: Reference point M8 is private and therefore beyond the scope of standardisation.

**M9**: Reference point between one instance of the Media AF and another for the purpose of Media AF instance chaining.

NOTE 2: Reference point M9 is not defined by the 5GMS architecture.

**M10**: Reference point between one instance of the Media AS and another for the purpose of peer-to-peer media transport between different Media Clients.

NOTE 3: Reference point M10 is not defined by the 5GMS architecture.

**M11**: Reference point between the Media Session Handler and the Media Access Function (both in the Media Client) for the purpose of configuring the Media Session Handler and/or media access control.

Table 4.1.2.4-1 Mapping of 5GMS reference points to generalized 5G Media Delivery architecture

|  |  |  |
| --- | --- | --- |
| Generalized Media Delivery architecture reference point | 5GMSd reference point | 5GMSu reference point |
| M1 | M1d | M1u |
| M2 | M2d | M2u |
| M3 | M3d | M3u |
| M4 | M4d | M4u |
| M5 | M5d | M5u |
| M6 | M6d | M6u |
| M7 | M7d | M7u |
| M8 | M8d | M8u |
| M9 | Not defined | Not defined |
| M10 | Not defined | Not defined |
| M11 | M6d, M7d | M6u, M7u |

#### 4.1.2.5 Interfaces and APIs

##### 4.1.2.5.1 Interfaces and APIs supporting media session handling

The Media AF exposes the following network service interfaces for media session handling:

- *Provisioning API* (Maf\_Provisioning): External API, exposed to the Media Application Provider by the Media AF at reference point M1 to provision the usage of the Media Delivery and to obtain feedback.

- *Media Session Handling API* (Maf\_SessionHandling) exposed by a Media AF to the Media Session Handler at reference point M5 and/or to the Media AS at reference point M3 for media session handling, control, reporting and assistance that also include appropriate security mechanisms, e.g. authorization and authentication.

The Media Session Handler exposes the following UE APIs for media session handling:

- *Media Session Handling Client API*: exposed by the Media Session Handler to the Media-aware Application at reference point M6 and to the Media Access Function at reference point M11, for configuring media session handling, including service launch.

##### 4.1.2.5.2 Interfaces and APIs supporting media transport

The Media AS exposes the following network service interfaces to support media transport:

- *Media Application Server Configuration API* (Mas\_Configuration) used by the Media AF at reference point M3 to configure the Media AS.

The Media AS exposes the following media transport interfaces:

- *Application Provider media transport interface* between the Media AS and the Media Application Provider, used to exchange media data using a media transport protocol at reference point M2.

- *Client-facing media transport interface* between the Media Access Function and the Media AS, used to exchange media data using a media transport protocol at reference point M4.

The Media Access Client exposes the following UE APIs for media access control:

- *Media Access Control API* exposed by the Media Access Function to the Media-aware Application at reference point M7 and to the Media Session Handler at reference point M11, in order to configure and communicate with the Media Access Function.

##### 4.1.2.5.3 Interfaces and APIs supporting application functionality

The Media Application Provider exposes the following network service interfaces to support application functionality:

- *Application-private API* used for information exchange between the Media-aware Application and the Media Application Provider at reference point M8.

# ===== CHANGE =====

### 4.2.3 Service Access Information for downlink media streaming

The Service Access Information is the set of parameters and addresses which are needed by the 5GMSd Client to activate and control the reception of a downlink streaming session, and to report service/content consumption and/or QoE metrics.

The Service Access Information may be provided together with other service announcement information using M8d. Alternatively, the 5GMSd Client fetches the Service Access Information from the 5GMSd AF. The Service Access Information may be provided as, or may be accessed via, a 3GPP-defined Service URL that provides a unique resolvable identifier to the 5GMSd Provisioning Session and that may also include a reference to the Media Player Entry. Regardless of how it is provided, the Service Access Information contains different information, depending on the collaboration model between the 5GMS System and the 5GMSd Application Provider, and also depending on offered features. Baseline parameters are listed in Table 4.2.3‑1 below:

Table 4.2.3-1: Parameters of baseline Service Access Information

|  |  |
| --- | --- |
| Parameters | Description |
| Provisioning Session identifier | Unique identification of the M1d Provisioning Session. |

When the content hosting feature is activated for a downlink streaming session, the parameters from Table 4.2.3-1a below can additionally be present.

Table 4.2.3-1a: Streaming Access parameters

|  |  |
| --- | --- |
| Parameters | Description |
| Media Player Entries | A set of pointers to documents that each define an equivalent media presentation (see NOTE), e.g. MPD for DASH content or URL to a video clip file.  Each member of the set may specify additional details to aid selection by the 5GMS Client, including content type, profile indicators and precedence.  A Media Player Entry document may additionally include Service Descriptions, each one identified by an *External reference* that enables it to be matched with a Policy Template, and each describing the set of media streaming parameters (e.g., bit rate, target latency) that realise a Service Operation Point.  A Media Player Entry URL may be embedded in a 3GPP Service URL. |
| NOTE: An equivalent media presentation is one which has the same content but may result in a different Quality of Experience. | |

When the consumption reporting feature is activated for a downlink streaming session, the parameters from Table 4.2.3‑2 below are additionally present.

Table 4.2.3-2: Parameters for consumption reporting configuration

|  |  |
| --- | --- |
| Parameters | Description |
| Reporting interval | Identifies the interval between consumption reports being sent by the Media Session Handler. |
| Server address | A list of 5GMSd AF addresses where the consumption reports are sent by the Media Session Handler. |
| Sample percentage | The proportion of clients that shall report media consumption.  If not specified, all clients shall send reports. |
| Location reporting | Identify whether the Media Session Handler provides location data to the 5GMSd AF (in case of MNO or trusted third parties) |

When the dynamic policy invocation feature is activated for a downlink streaming session the parameters from Table 4.2.3‑3 below are additionally present.

Table 4.2.3-3: Parameters for dynamic policy invocation configuration

|  |  |
| --- | --- |
| Parameters | Description |
| Server address | A list of 5GMSd AF addresses (in the form of opaque URLs) which offer the APIs for dynamic policy invocation sent by the 5GMS Media Session Handler. |
| Valid Policy Template Ids | A list of Policy Template identifiers which the 5GMSd Client is authorized to use. |
| Service Data Flow Methods | A list of recommended Service Data Flow description methods (descriptors), e.g. 5-Tuple, ToS, 2-Tuple, etc, which should be used by the Media Session Handler to describe the Service Data Flows for the traffic to be policed. |
| External reference | Additional identifier for this Policy Template, unique within the scope of its Provisioning Session, that can be cross-referenced with external metadata about the streaming session. |

When the metrics collection and reporting feature is activated for a downlink streaming session, one or more parameter sets for metrics configuration, according to Table 4.2.3‑4, are additionally present. Each metrics configuration set contains specific settings valid for that configuration, which is typically metric scheme dependent, and collection and reporting shall be done separately for each set.

Table 4.2.3-4: Parameters for each metrics configuration set

|  |  |
| --- | --- |
| Parameters | Description |
| Scheme | The scheme associated with this metrics configuration set. A scheme may be associated with 3GPP or with a non-3GPP entity. If not specified, a default 3GPP metrics scheme shall apply.  Metrics schemes shall be uniquely identified by URIs. |
| Server address | A list of 5GMSd AF addresses to which metric reports shall be sent for this metrics configuration set. |
| DNN | The Data Network Name (DNN) which shall be used when sending metrics report for this metrics configuration set.  If not specified, the default DNN shall be used. |
| Slice scope | A list of network slice(s) for which metrics collection and reporting shall be executed for this metrics configuration set.  If not specified, the metrics collection and reporting shall be done for all network slices. |
| Reporting interval | The sending interval between metrics reports for this metrics configuration set.  If not specified, a single final report shall be sent after the streaming session has ended. |
| Sample percentage | The proportion of streaming sessions that shall report metrics for this metrics configuration set.  If not specified, reports shall be sent for all sessions. |
| Streaming source filter | A list of content URL patterns for which metrics reporting shall be done for this metrics configuration set.  If not specified, reporting shall be done for all URLs. |
| Metrics | A list of metrics which shall be collected and reported for this metrics configuration set.  For progressive download and DASH streaming services, the listed metrics are associated with the 3GPP metrics scheme and shall correspond to one or more of the metrics as specified in clauses 10.3 and 10.4, respectively, of TS 26.247 [7].  In addition, for the 3GPP metrics scheme as applied to DASH streaming, the quality reporting scheme and quality reporting protocol as defined in clauses 10.5 and 10.6, respectively, of [7] shall be used.  If not specified, a complete (or default if applicable) set of metrics will be collected and reported. |

When 5GMSd AF-based Network Assistance is activated for a downlink streaming session the parameters from Table 4.2.3‑5 below shall be additionally present.

Table 4.2.3-5: Parameters for 5GMSd AF-based Network Assistance configuration

|  |  |
| --- | --- |
| Parameters | Description |
| Server address | 5GMSd AF address that offers the APIs for 5GMSd AF-based Network Assistance, accessed by the 5GMSd Media Session Handler. The server address shall be an opaque URL, following the 5GMS URL format. |