ETSI TS 126 501 V17.9.0 (2024-04)

5G;
5G Media Streaming (5GMS);
General description and architecture
(3GPP TS 26.501 version 17.9.0 Release 17)

Reference
RTS/TSGS-0426501vh90

Keywords
5G

ETSI

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Contents

Foreword

This Technical Specification has been produced by the 3rd Generation Partnership Project (3GPP).

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1 Scope

The present document specifies the 5G Media Streaming (5GMS) architecture. The 5GMS supported services include MNO and third-party Downlink Media Streaming Services, and MNO and third-party Uplink Media Streaming Services. The 5GMS architecture supports related network and UE functions and APIs, backwards compatible functions for EUTRAN deployments (with and without MBMS) and 5G specific features.

NOTE: Support of 5G Media Streaming over MBMS with 5GC is not considered in the current version of the present document.

The 5GMS architecture is functionally divided into independent components enabling different deployments with various degrees of integration between 5G MNOs and Content Providers. It is specified as a set of extensions to TS 23.501 "System Architecture for the 5G System".

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 TS 23.501: "System architecture for the 5G System (5GS)".

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

[4] 3GPP TS 23.503: "Policy and charging control framework for the 5G System (5GS); Stage 2".

[5] 3GPP TS 26.238: "Uplink streaming".

[6] 3GPP TS 26.307: "Presentation layer for 3GPP services".

[7] 3GPP TS 26.247: "Transparent end-to-end Packet-switched Streaming Service (PSS); Progressive Download and Dynamic Adaptive Streaming over HTTP (3GP-DASH)".

[8] 3GPP TS 26.234: "Transparent end-to-end Packet-switched Streaming Service (PSS); Protocols and codecs".

[9] 3GPP TS 23.003: "Technical Specification Group Core Network and Terminals; Numbering, addressing and identification".

[10] 3GPP TS 28.530: "Management and orchestration; Concepts, use cases and requirements".

[11] 3GPP TS 28.531: "Management and orchestration; Provisioning".

[12] 3GPP TS 28.541: "Management and orchestration; 5G Network Resource Model (NRM); Stage 2 and stage 3".

[13] 3GPP TS 23.222: "Common API Framework for 3GPP Northbound APIs".

[14] IETF RFC 1034: "Domain names - concepts and facilities".

[15] 3GPP TS 23.548: "5G System Enhancements for Edge Computing; Stage 2".

[16] 3GPP TS 23.558: "Architecture for enabling Edge Applications".

[17] 3GPP TS 28.538: "Management and orchestration; Edge Computing Management".

[18] 3GPP TS 23.246: "Multimedia Broadcast/Multicast Service (MBMS); Architecture and functional description".

[19] 3GPP TS 26.346: "Multimedia Broadcast/Multicast Service (MBMS); Protocols and codecs".

[20] 3GPP TS 26.347: "Multimedia Broadcast/Multicast Service (MBMS); Application Programming Interface and URL".

[21] 3GPP TS 26.348: "Northbound Application Programming Interface (API) for Multimedia Broadcast/Multicast Service (MBMS) at the xMB reference point".

[22] 3GPP TS 26.531: "Data collection and reporting; General description and architecture".

[23] 3GPP TS 23.288: "Architecture enhancements for 5G System (5GS) to support network data analytics services".

[24] 3GPP TS 27.007: "AT command set for User Equipment (UE)".

3 Definition of terms, symbols and abbreviations

3.1 Terms

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

5GMS System: An assembly of Application Functions, Application Servers and interfaces from the 5G Media Streaming architecture that support either downlink media streaming services or uplink media streaming services, or both.

NOTE 1: The components of a 5GMS System may be provided by an MNO as part of a 5GS and/or by a 5GMS Application Provider.

5GMS Application Provider: A party that interacts with functions of the 5GMS System and supplies a 5GMS-Aware Application that interacts with functions of the 5GMS System.

5GMS-Aware Application: Application in the UE, provided by the 5GMS Application Provider, that contains the service logic of the 5GMS application service, and interacts with other 5GMS Client and Network functions via the interfaces and APIs defined in the 5GMS architecture.

NOTE 2: Functionality of the 5GMS-Aware Application is outside the scope of this specification.

NOTE 3: A 5GMS-Aware Application associated with the delivery of either a downlink or uplink related 5GMS service is referred to as a 5GMSd-Aware Application or a 5GMSu-Aware Application, respectively.

5GMS Client: A UE function that is either a 5GMSd Client or a 5GMSu Client, or both.

5G Media Streaming Client for downlink (5GMSd Client): UE function that includes at least a 5G Media Streaming Player and a Media Session Handler for downlink streaming and that may be accessed through well-defined interfaces/APIs.

5G Media Streaming Client for uplink (5GMSu Client): Originator of 5GMSu service that includes at least a Media Streamer and a Media Session Handler for uplink streaming and that may be accessed through well-defined interfaces/APIs.

5GMSu Media Streamer: UE function that enables uplink delivery of streaming media content to an Application Server function of the 5GMS Application Provider, and which interacts with both the 5GMSu-Aware Application for media capture and subsequent streaming, and the Media Session Handler for media session control.

NOTE 4: The 5GMSu Media Streamer receives a Media Streamer Entry to initiate an uplink streaming session.

NOTE 5: The 5GMSu Media Streamer captures the media on the provided input devices. The 5GMSu Media Streamer exposes some basic controls such as capture, pause, and stop to the 5GMSu-Aware Application.

Dynamic policy: A Dynamic PCC Rule (c.f. TS 23.503 [4]) for an uplink or downlink application flow during a media session.

Egest Session: An uplink media streaming session from the 5GMSu AS towards the 5GMSu Application Provider.

Ingest Session: A session to upload the media content into a 5GMSd AS.

Policy Template: A collection of (semi-static) PCF/NEF API parameters which are specific to the 5GMS Application Provider and also the resulting PCC Rule.

Policy Template Id: Identifies the desired policy template, which is used by 5GMSd AF to select the appropriate PCF/NEF API towards the 5G System so that the PCF can compile the desired PCC Rule.

Media Entry Point: A Media Player Entry for downlink media streaming or a Media Streamer Entry for uplink media streaming intended to be consumed by a 5GMS Media Stream Handler.

Media Player Entry: A document or a pointer to a document that defines a downlink media streaming presentation e.g. MPD for DASH content or URL to a video clip file intended to be consumed by a 5GMSd Media Player.

Media Session Handler: UE function that communicates with the 5GMS AF in order to establish and control the delivery of a streaming media session in the downlink or uplink direction, and which also exposes APIs to the 5GMS-Aware Application and to the Media Player (for downlink streaming) or the Media Streamer (for uplink streaming).

Media Streamer Entry: A pointer (e.g. in the form of a URL) that defines an entry point of an uplink media streaming session intended to be consumed by a 5GMSu Media Streamer.

media streaming session: A session initiated by a 5GMS-Aware Application that involves one or more media streams being delivered between the 5GMS AS and the 5GMS Client via reference point M4.

presentation entry: A document or a pointer to a document that defines an application presentation e.g. an HTML5 document as defined in e.g. TS 26.307 [6].

Provisioning Session: A data structure supplied at interface M1 by a 5GMS Application Provider that configures the 5GMS features relevant to a set of 5GMS-Aware Applications.

5GMSd Media Player: UE function that enables playback and rendering of a media presentation based on a Media Player Entry and exposing some basic controls such as play, pause, seek, stop to the 5GMSd-Aware Application.

NOTE 6: A 5GMSd Media Player is expected to include a Media Access Client, Media Decoders, Media rendering/presentation, and possibly also a DRM Client a Consumption Measurement and Logging Client and a Metrics Measurement and Logging Client. The 5GMSd Media Player's Media Access Client receives a Media Player Entry. The 5GMSd Media Player renders the media on the provided output devices, such as a display in case of video.

NOTE 7: The 5GMSd Media Player is functionally similar to the combination of a TS 26.247 [7] 3GP-DASH client and a TS 26.234 [8] PSS media decoder and renderer.

Service Access Information: Set of parameters and addresses that are needed by a 5GMS Client to activate the reception of a downlink media streaming session or the transmission on an uplink media streaming session, perform dynamic policy invocation, consumption reporting and/or metrics reporting, and request AF-based network assistance.

Service and Content Discovery: Functionality and procedures provided by a 5GMSd Application Provider to a 5GMS-Aware Application that enables the end user to discover the available streaming service and content offerings and select a specific service or content item for access.

NOTE 8: The Service and Content Discovery functionality and procedures are outside the scope of this specification.

Service Announcement: Procedures conducted between the 5GMS-Aware Application and the 5GMS Application Provider such that the 5GMS-Aware Application is able to obtain 5GMS Service Access Information, either directly or in the form of a reference to that information.

Service Data Flow: As defined in TS 23.503 [4] ("An aggregate set of packet flows carried through the UPF that matches a service data flow template").

Service Data Flow Description: A set of parameters and/or parameter ranges used by the 5GMS AF to create a Service Data Flow Template.

third party player: Part of an application that uses APIs to exercise selected 5GMSd functions to play back media content.

NOTE 9: Such APIs are for example defined in TS 26.307 [6] when using the Media Source Extensions for media playback. This type of player is downloaded by or built into an application, or it is downloaded with the Presentation Entry (e.g. as a JavaScript library).

third party uplink streamer: Part of an application that uses APIs to exercise selected 5GMSu functions to capture and stream media content.

NOTE 10: This type of streamer is typically implemented as downloadable software.

3.2 Symbols

Void.

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
ANBR	Access Network Bit rate Recommendation
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
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

4 Media Streaming architecture

4.0 Media Streaming features (informative)

4.0.1 Introduction

This clause defines a set of high-level features for supporting enhanced media streaming in the 5G System. The functional architecture of this 5G Media Streaming (5GMS) System is defined in clause 4.1 and is further specialised for downlink media streaming (clause 4.2) and uplink media streaming (clause 4.3). Procedures for downlink media streaming are defined in clause 5 and those for uplink media streaming in clause 6.

In the context of the present document, streaming is defined as the delivery of time-continuous media as the predominant media. Streaming points to the fact that the media is predominantly sent only in a single direction and consumed as it is received. Additionally, the media content may be streamed as it is produced, referred to as live streaming. If content is streamed that is already produced, it is referred to as on-demand streaming.

References to Dynamic Adaptive Streaming over HTTP (MPEG-DASH) [29] in the present document apply equally to HTTP Live Streaming (HLS) [28] except where noted otherwise. The term *Media Entry Point* is used to refer generically to an MPEG-DASH Media Presentation Description (MPD) but may be taken to apply equally to alternative media presentation description formats such as an HLS master playlist, unless noted otherwise.

Table 4.0.1-1 lists the principal features of the 5GMS architecture along with cross-references to relevant clauses defining its functions and procedures.

Table 4.0.1-1: 5G Media Streaming feature index

Feature	Feature description clause	Procedure definition clause(s)	
		Downlink media streaming	Uplink media streaming
Content hosting	4.0.2	5.4	Not applicable
Content publishing	4.0.3	Not applicable	Not defined
Content preparation	4.0.4	Not defined	Not defined
Network assistance	4.0.5	5.9	6.5, 6.7
Dynamic policies	4.0.6	5.8	Not defined
Remote control	4.0.7	Not applicable	6.6
Consumption reporting	4.0.8	5.6	Not applicable
QoE metrics reporting	4.0.9	5.5	Not applicable
Edge processing	4.0.10	8	
eMBMS delivery	4.0.11	5.10	Not applicable
Data collection, reporting and exposure	4.0.12	5.11	6.8

The following clauses introduce these features in terms of network-side components ("5GMS network services") and a UE-side client component referred to variously as the *5GMSd Client* (for downlink media streaming), *5GMSu Client* (for uplink media streaming), or simply *5GMS Client* (in the case of features applicable to either downlink media streaming or uplink media streaming).

4.0.2 Content hosting

The content hosting feature is applicable to downlink media streaming only. It provides a service equivalent to a Content Delivery Network (CDN) deployed inside or outside the Trusted DN. High-level procedures for this feature are defined in clause 5.4.

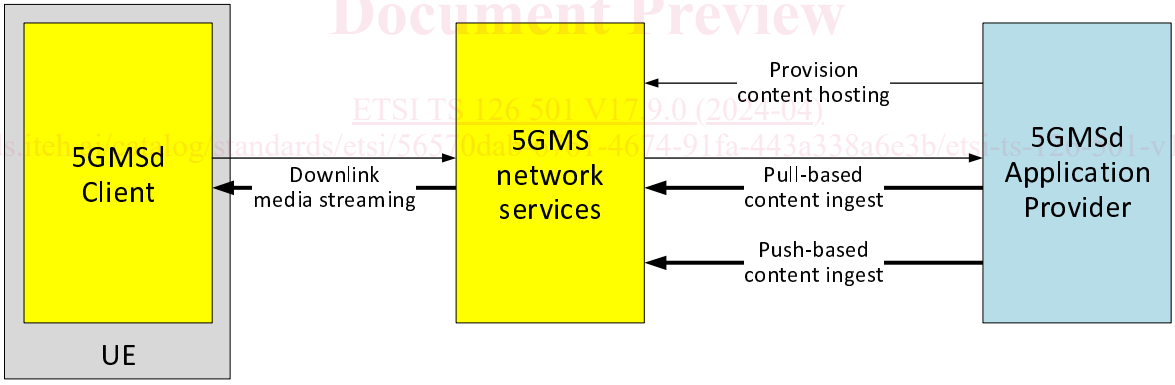

Figure 4.0.2-1: High-level arrangement for content hosting feature

When a 5GMSd Application Provider has provisioned the content hosting feature for downlink media streaming:

1. Media content is either retrieved by a network-side component of the 5GMS System from a media origin at the 5GMSd Application Provider (pull-based content ingest) or else it is published to a network-side component of the the 5GMS System by the 5GMSd Application Provider (push-based content ingest).

2. The network-side component of the 5GMS System may cache this content for a configurable period of time.

3. Network-side components of the 5GMS System may manipulate the content according to rules provisioned in Content Preparation Templates (see clause 4.0.4).

4. The 5GMSd Client in the UE subsequently retrieves the (possibly manipulated) media content as part of a downlink media streaming session. The security of the content served to the 5GMSd Client by network-side components of the 5GMS System may be guaranteed by a provisioned Server Certificate.