**3GPP TSG-WG SA4 Meeting #132S4-251118**

**Fukuoka, Japan, 19th – 23rd May, 2025 (revision of S4-250895)**

|  |
| --- |
| *CR-Form-v12.3* |
| **CHANGE REQUEST** |
|  |
|  | **26.512** | **CR** | **0090** | **rev** | **1** | **Current version:** | **18.5.0** |  |
|  |
| *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 | **X** | Radio Access Network |  | Core Network | **X** |

|  |
| --- |
|  |
| ***Title:***  | Support of Improved QoS for media streaming services |
|  |  |
| ***Source to WG:*** | Huawei, HiSilicon |
| ***Source to TSG:*** | S4 |
|  |  |
| ***Work item code:*** | AMD\_PRO-MED |  | ***Date:*** | 2025-05-13 |
|  |  |  |  |  |
| ***Category:*** | **B** |  | ***Release:*** | Rel-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 canbe 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:*** | In FS\_AMD, stage 3 work on integrating ECN marking for L4S, PDU Set handling and QoS monitoring is needed. Furthermore, the media access fucntion also needs to behave, e.g. activation of L4S marking. Therefore, this paper intends to update the media plane aspects.  |
|  |  |
| ***Summary of change:*** | Support of Improved QoS for media streaming services |
|  |  |
| ***Consequences if not approved:*** | Incomplete support of improved QoS for media streaming services and work item AMD\_PRO-MED cannot be completed. |
|  |  |
| ***Clauses affected:*** | 2, 4.3.7.1, 4.6.0 (new), 4.7.3, 4.9.3, 5.3 (new), 5.4 (new), 5.5 (new), 5.6 (new), 5.7 (new), 5.8 (new), 5.9 (new), 5.10 (new), 13.2.1, 13.2.4 |
|  |  |
|  | **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:*** |  |

\* \* \* \* Change \* \* \* \*

## 2 References

[X1] IETF RFC 9330:"Low Latency, Low Loss, Scalable Throughput (L4S) Internet Service: Architecture".

[X2] IETF RFC 9331: "Explicit Congestion Notification (ECN) Protocol for Very Low Queuing Delay (L4S)".

[X3] IETF RFC 9332: "Dual-Queue Coupled Active Queue Management (AQM) for Low Latency, Low Loss, and Scalable Throughput (L4S)".

Procedures of the M4d (Media Streaming) interface

#### 4.3.7.1 General

The 5GMS Application Provider shall use the operations specified in clause 5.2.7 of TS 26.510 [56] at reference point M1 when it wants to create and subsequently manipulate Policy Templates available for the use of downlink or uplink media streaming sessions of a particular Provisioning Session in the 5GMS AF.

As specified in clause 5.2.7.1 of TS 26.510 [56], the 5GMS AF is responsible for ensuring that 5GMS AS supports L4S according to RFC 9330 [X1], RFC 9331 [X2] and RFC 9332 [X3] at reference point M4 before accepting a Policy Template that declares a preference for ECN marking for L4S functionality.

Procedures of the M4d (Media Streaming) interface

### 4.6.0 General

#### 4.6.0.1 ECN marking for L4S

When a Dynamic Policy Instance (see clause 4.7.3) enabling the ECN marking for L4S functionality is successfully activated for a downlink media streaming session, the 5GMSd AS shall support L4S according to RFC 9330 [X1], RFC 9331 [X2] and RFC 9332 [X3] at reference point M4d.

\* \* \* \* Change \* \* \* \*

### 4.7.3 Procedures for dynamic policy invocation

These procedures are used by a Media Session Handler to manage Dynamic Policy Instance resources in the 5GMS AF. To do this, the Media Session Handler shall use the operations specified in clause 5.3.3 of TS 26.510 [56] at reference point M5 to instantiate Policy Templates in the 5GMS AF that are described in the Dynamic Policy Configuration provided in the Service Access Information (see clause 4.7.2).

The choice of Policy Template by the Media Session Handler shall be influenced by the following considerations:

- When instantiating a Policy Template whose Policy Template Binding indicates l4S‌Enablement‌Preference set to true, the Media Session Handler shall set the l4SRequired flag to true in the Dynamic Policy request only if an L4S-capable media transport stack is present and in use.

 In case of availability of API access for the statistics of ECN marks, the Media Session Handler shall interrogate the capabilities of the Media Player in order to discover whether it has an L4S-capable media transport stack.

- When instantiating a Policy Template whose Policy Template Binding indicates qoSMonitoring‌Enablement‌Preference set to true, the Media Session Handler shall set the qoS‌Monitoring‌Required flag to true in the Dynamic Policy request only if an L4S-capable media transport stack is present and in use.

 The Media Session Handler shall interrogate the capabilities of the Media Player in order to discover whether it is capable of consuming QoS monitoring results and shall select a Policy Template that indicates the preference of QoS monitoring functionality only if the Media Player has this capability.

\* \* \* \* Change \* \* \* \*

### 4.9.3 Dynamic Policy procedures

These procedures are used between a Media Player and a Media Session Handler at reference point M11.

If the Media Player is capable of consuming QoS monitoring results, it shall subscribe to receive QoS monitoring results notifications from the Media Session Handler at reference point M11 as specified in clause 5.4.3 of TS 26.510 [56].

Procedures for uplink media streaming

## 5.3 Procedures of the M1u (5GMSu Provisioning) interface

Procedures at this reference point are for further study.

## 5.4 Procedures of the M2u (5GMSu content egest) interface

Procedures at this reference point are for further study.

## 5.5 Procedures of the M3u interface

Procedures at this reference point are for further study.

## 5.6 Procedures of the M4u (Media Streaming) interface

### 5.6.1 General

Procedures at this reference point are for further study.

### 5.6.2 ECN marking for L4S

When a Dynamic Policy Instance (see clause 4.7.3) enabling the ECN marking for L4S functionality is successfully activated for an uplink media streaming session, the 5GMSu AS shall support L4S according to RFC 9330 [X1], RFC 9331 [X2] and RFC 9332 [X3] at reference point M4d.

## 5.7 Procedures of the M5u (Media Session Handling) interface

Procedures at this reference point are for further study.

## 5.8 Procedures of the M6u (UE Media Session Handling) interface

Procedures at this reference point are for further study.

## 5.9 Procedures of the M7u (UE Media Player) interface

Procedures at this reference point are for further study.

## 5.10 Procedures of the M8u interface

This clause defines basic procedures at reference point M8u.

No specific procedures are defined but it is expected that the 5GMSu Application Provider can provide media session entry points to a 5GMSu-Aware Application through reference point M8u. The 5GMSu-Aware Application would then initiate the uplink media session by providing such an entry point to the 5GMSu Client through reference point M7u. Multiple alternative entry points of the same uplink media streaming service may be provided.

\* \* \* \* Change \* \* \* \*

### 13.2.1 Overview

In the following, it is assumed that the Media Player (in this case a DASH client) adheres to a basic set of functionalities as shown in figure 13.2-1. The DASH client downloads, processes and presents a DASH Media Presentation under the control of a 5GMSd-Aware Application via reference point M7d or of the Media Session Handler via reference point M11d.

The 5GMSd-Aware Application may, in addition, configure the presentation of the media, receive notifications on events, or query the internal status of the DASH Player, also supported through reference point M7d. Different functions of the DASH Access Client that are typically necessary to process a DASH Media Presentation, are shown in figure 13.2-1. Additional functions may be available as well.



Figure 13.2.1-1: Architecture of DASH-based 5GMSd Client

The key functionalities of each of the functions as shown in figure 13.2-1 are summarized in the following:

- *5GMSd-Aware Application:* Application that makes use of the DASH-based Media Player to play back a DASH Media Presentation using the APIs defined in this clause.

- *Media Player:* A complete player for the playback of a Media Presentation, including the Media Playback and Content Decryption Platform as defined in TS 26.511 [35].

- *Access Client:* A part of the DASH Player that accesses and downloads of the resources and provides the downloaded resources to the Media Playback Platform and Content Decryption for the playback of DASH content.

- *Management:* Controls all internal processes and the communication with the 5GMSd-aware application. In particular this includes the handling of service descriptions and operation points.

- *MPD Processing:* parses and processes the MPD and extracts the relevant information.

- *Adaptation Set Selection:* selects the Adaptation Set based on user, application and/or device capability information. Information provided through M7d may be used.

- *ABR Controller and Dynamic Switching:* runs adaptive bit rate logic and triggers adaptive switching of Representations. Information provided to the Media Player via reference point M7d may be used.

- *Throughput Estimation:* estimates the network status, i.e. throughput, congestion information on the transmission link between the Media Player and the 5GMSd Application Server. Information provided to the Media Player via reference point M11d may be considered within the throughput estimation, i.e. QoS monitoring results.

 Additionally, when ECN marking for L4S according to RFC 9330 [X1], RFC 9331 [X2] and RFC 9333 [X3] is activated (as notified by the Media Session Handler using the L4S\_ENABLED notification at reference point M11d) ECN marking of congestion in downlink packets may additionally be considered as input to throughput estimation, subject to the availability of a suitable low-level API.

- *Metrics Logging:* logs relevant low-level metrics and provides those to the metrics aggregation and reporting functions in the Media Session Handler.

- *Media Playback Management and Protection Controller:* manages the media playback by moving downloaded information into media playback platform and also addresses handling of protection and DRM related information.

- *Media Playback and Content Decryption Platform:* plays back CMAF-based media content according to the playback requirements in TS 26.511 [35]. It also provides status information as well as events that maybe be provided through M7d.

- *Event Processing:* Processes DASH events and provides information to the 5GMSd-Aware Application as defined in TS 26.247 [4].

This clause focuses on interactions with the Media Player through reference point M7d. In particular, the following aspects of the API are defined:

1) Methods to interact with the Media Player at this reference point are defined in clause 13.2.3.

2) Notification and Error Events raised by the Media Player at this reference point are defined in clause 13.2.4.

3) Configuration and Settings of the Media Player at this reference point are defined in clause 13.2.5.

4) Status Information exposed by the Media Player at this reference point is defined in clause 13.2.6.

Communication between the Access Client and the media playback platform of the Media Player is defined in TS 26.511 [35].

A 5GMSd Client for DASH distribution shall support the APIs defined in this clause 13.

NOTE: The initial APIs have largely been designed based on the dash.js APIs documented here: <http://cdn.dashjs.org/latest/jsdoc>.

\* \* \* \* Change \* \* \* \*

### 13.2.4 Configurations and settings API

DASH streaming for a particular downlink media delivery session may be configured by the 5GMSd-Aware Application at reference point M7d or by the Media Session Handler at reference point M11d with the parameters provided in table 13.2.4-1. Note that these parameters may be set and they may also be observed.

Table 13.2.4-1: Media Player Configuration API

|  |  |  |
| --- | --- | --- |
| Status | Type | Definition |
| sessionId | string | A media delivery session identifier for the downlink media streaming session that has been initialised using the method specified in clause 13.2.3.2. |
| capabilities | array(enum) | A read-only list of Media Player capabilities.See table 13.2.4‑2. |
| source | Object | Provides the MPD and all contained information. |
| consumptionMode | Enum | Defines two modes:live: in this case the target latency is maintained, if specified in the service description, according to the parametersvod: in this case the latency is set by the application and the latency settings are ignored. |
| maxBufferTime | Integer | Maximum buffer time in milliseconds for the service.  |
| serviceDescriptionId | id | Selects a service description by selecting an identifier. |
| serviceDescriptions[] | Service description parameters | Configures a service description as defined in annex K of ISO/IEC 23009-1 [32]. This allows the application to define additional service descriptions beyond those defined in the MPD. |
|  | id | id | Sets a service description identifier different from the ones available in the service descriptions in the MPD or modifies existing service descriptions. |
|  | serviceLatency | Object | Sets service description parameters for the service latency, as defined in table K.1 of ISO/IEC 23009-1 [32]. |
|  | playBackRate | Object | Sets service description parameters for the playback rate, as defined in table K.2 of ISO/IEC 23009-1 [32] when the service is consumed in live mode. |
|  | operatingQuality | Object | Sets service description parameters for the operating quality, as defined in table K.3 of ISO/IEC 23009-1 [32]. |
|  | operatingBandwidth | Object | Sets service description parameters for the operating bandwidth, as defined in table K.4 of ISO/IEC 23009-1 [32]. |
| mediaSettings[] | Media type audio, video, subtitle | Sets the selected Adaptation Set based on the available Adaptation Sets for each media type. |
| metricsConfiguration[ ] | Object | Zero or more sets of settings for collecting metrics in relation to the downlink media streaming session. |

Table 13.2.4-2: Media Player capabilities enumeration

|  |  |
| --- | --- |
| Status | Definition |
| CAPABILITY\_L4S | The Media Player has a protocol stack capable of handling ECN marking for L4S according to RFC 9330 [X1], RFC 9331 [X2] and RFC 9333 [X3]. |
| CAPABILITY\_QOS | The Media Player is capable of reacting to QoS monitoring results. |

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