**3GPP TSG-SA WG4 Meeting #131-bis-e S4-250633**

**Online, 11 – 17 April 2025** revision of S-250459 and merge of S4-250632

**Agenda item:** 8.5

**Source:** Qualcomm Germany

**Title:** [AMD\_PRO-MED] Detailed work topics for CMCD introduction

**Document for** Agreement

# Introduction

During SA4#131 Work Item on “Stage 3 for Advanced Media Delivery” was agreed in [S4-250411](https://www.3gpp.org/ftp/tsg_sa/WG4_CODEC/TSGS4_131_Geneva/Docs/S4-250411.zip) and afterwards approved in by SA plenary #107 in [SP-250265](https://www.3gpp.org/ftp/tsg_sa/TSG_SA/TSGS_107_Incheon_2025-03/Docs/SP-250265.zip).

The objective of this work item is to address the recommendations for stage-3 extensions of the studies FS\_AMD and FS\_MS\_NS\_Ph2 in the relevant specifications, primarily TS 26.510, TS 26.512 and TS 26.517, and based on the stage-2 extensions in TS 26.501 and TS 26.502.

For CMCD, the following aspects are identified.

Stage-3 work has also been recommended in clause 7.4.3 of TR 26.804:

1. For *Common Client Metadata* as introduced in clause 5.16 of TR26.804 and based on the conclusions in clause 6.16 of TR26.804.

The objective of this work item is to address the recommendations for stage-3 extensions of the studies FS\_AMD and FS\_MS\_NS\_Ph2 in the relevant specifications, primarily TS 26.510, TS 26.512 and TS 26.517, and based on the stage-2 extensions in TS 26.501 and TS 26.502. Specifically, the following objectives are identified:

2. Provide relevant extensions to the Stage 3 5G Media Streaming protocols:

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

i. Updates to TS 26.247 to introduce CMCD

ii. Updates to TS 26.510 to introduce CMCD, if needed

iii. Updates to TS 26.512 to introduce CMCD,

iv. Updates to TS 26.532 to introduce CMCD, and

v. other relevant aspects resulting from stage-2.

3. For key topic address the following aspects:

a. Specify the required protocols or protocol extensions

b. Define relevant APIs

c. Specify the OpenAPIs YAML as well as other stage-3 API.

e. Address remaining stage-3 aspects.

4. Coordinate work with other 3GPP groups as needed. For details see clause 8.

5. 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.

This document initiates the work topic for CMCD. It is also considered to support the development of the CMCD feature with parallel implementation in 5G-MAG Reference Tools.

# Summary of TR 26.804

In [TR 26.804](https://www.3gpp.org/ftp/Specs/archive/26_series/26.804/26804-j01.zip), the analysis in clause 5.16.1.3 and annex B indicates minimal overlap between CMCD information and existing reporting mechanisms for 5G Media Streaming (QoE metrics reporting and consumption reporting). Based on this, it is recommended that CMCD be considered as a supplementary reporting mechanism for media client data at this point, operating alongside QoE metrics reporting and consumption reporting.

The operational optimisations of the 5GMSd AS envisaged in point 1 of clause 5.16.1.2 cannot be realised with the out-of-band reporting solution outlined in clauses 5.16.3.3, 5.16.4.3 and 5.16.5.3. For this reason, out-of-band reporting is not a preferred solution.

The preferred solution is Option 1 "In-band reporting of CMCD information via reference points M4d and M3d", for the following reasons:

- In-band reporting reference point M4d is broadly implemented in common media clients nowadays.

- In-band reporting permits operational optimizations by the 5GMSd AS, which is not the case with Option 3 Out-of-band reporting of CMCD information via reference points M11d and M5d. Solely on the basis of this issue, Option 1 and Option 2 would remain valid candidates.

- Passing the CMCD information to the 5GMS AF at reference point M3d (Option 1) permits operational optimisations by the 5GMSd AF, which is not the case with Option 2 In-band reporting of CMCD information via reference points M5d and R4 where the CMCD information is handed directly to the Data Collection AF instantiated in the 5GMS AF, but is not visible to the latter.

- All envisaged use cases can be supported by Option 1.

Hence, it is recommended to implement the solution defined in clause 5.16.6.1 in the relevant 3GPP specifications.

Furthermore, there is a preference to provide deployment choices to the 5GMSd Service Provider to select the use of reporting scheme using either the CMCD query parameter or CMCD request headers.

# Details from TS 26.501

To be completed.

# Details from TR 26.804 – 5.16.6.1

#### 5.16.6.1 In-band reporting of CMCD information via reference points M4d and M3d

##### 5.16.6.1.1 Provisioning information at reference point M1d

Provisioning information is needed at reference point M1d to configure CMCD reporting, including delivery to the 5GMSd Application Provider [and to the OAM Server]. For this purpose, the following is a suitable solution:

- To support provisioning information to configure CMCD reporting, the metrics reporting provisioning procedures specified in clause 5.2.11 of TS 26.510 [108] may be reused at reference point M1d **with the controlled vocabulary of metrics reporting schemes specified in clause 7.8 of TS 26.512 [16] extended to describe the different forms of CMCD.**

- To support delivery of this information to the 5GMSd Application Provider, the Event Data Processing Configuration may be reused at reference point M1d per clause 5.2.13 of TS 26.510 [108] with the following enhancements needed to provision exposure of CMCD information as a distinct new type of event:

- **A new enumerated value of AfEvent specified in TS 29.517 [25] used to signal a CMCD event when one is exposed by the Data Collection AF instantiated in the 5GMSd AF.**

**- New collection and record data types specified in TS 26.512 [16] used by the Data Collection AF instantiated in the 5GMSd AF to expose CMCD information in events.**

- **A new DataDomain enumerated value specified in TS 26.532 [107] to specify data exposure restrictions for CMCD information.**

NOTE: Analysis of which data aggregation functions (count, mean, maximum, minimum, etc.) are appropriate to provision for CMCD information in the abovementioned data exposure restrictions is for further study.- Delivery of this information to the NWDAF is for further study.

In section 5 of this paper, a solution is proposed to reuse existing data types for QoE metrics to expose CMCD information. This avoids the need to specify a new enumerated value of AFEvent in TS 29.517. Instead of specifying new collection and record data types in TS 26.512, only a simple mapping of CMCD information into the existing collection and record data types for QoE metrics is needed. The existing data domain for 5GMS QoE metrics is reused, hence a new DataDomain enumerated value does not need to be specified in TS 26.532.

##### 5.16.6.1.2 Configuration signalling at reference point M3d

Configuration signalling at reference point M3d for the 5GMSd AS to collect CMCD information for specific sessions or all clients. To support this functionality, the following solution may be considered:

- Reuse client metrics reporting configuration in Service Access Information exposed by the 5GMSd AF to the 5GMSd AS at reference point M3d. **A new metrics reporting scheme representing the CMCD JSON format is specified in clauses 4.7.5, 7.8.1 and 11.4.1 of TS 26.512 [16]** and is always indicated regardless of which metrics reporting scheme has been provisioned at reference point M1d.

- In order to support this, **the 5GMSd AS configuration provided by the 5GMSd AF at reference point M3d as specified in clause 8.8 (and, for symmetry with uplink media streaming, clause 8.9) of TS 26.510 [108] needs to be enhanced to tell the 5GMSd AS which set of Service Access Information it needs to retrieve to obtain the correct client metrics reporting configuration. The external application identifier of the parent Provisioning Session needs to be additionally passed at reference point M3d. This may be achieved by enhancing the data model specified in clause 9.4.3 (and, for symmetry with uplink media streaming, clause 9.5.3) of TS 26.510 [108].**

In section 5 of this paper, an option for specifying four different metrics schemes for the four different classes of CMCD information is described, as well as an option for a single metrics scheme.

##### 5.16.6.1.3 Configuration signalling at reference point M5d

Provide CMCD configuration information to the Media Session Handler at reference point M5din order to configure collection and reporting of CMCD information by the 5GMSd Client. To support this functionality, the following solution may be considered:

- Reuse client metrics reporting configuration in Service Access Information exposed by the 5GMSd AF to the 5GMSd AS at reference point M5d. **A new metrics reporting scheme representing the CMCD query parameter or CMCD request header is specified in clauses 4.7.5, 7.8.1 and 11.4.1 of TS 26.512 [16]** and is always indicated.

##### 5.16.6.1.4 Media Player configuration API at reference point M11d

Media Player configuration API at reference point M11d to configure CMCD data collection and reporting, including the acknowledgement of the Media Player's capabilities.

##### 5.16.6.1.5 Data reporting at reference point M4d

The Media Player reports CMCD information at reference point M4d as part of media requests using either a CMCD query parameter or CMCD request headers as specified in CTA‑5004 [105]. The CMCD information conveys the media delivery session identifier chosen by the Media Session Handler.

If the next segment request is included, then CMCD needs to be extended to add the timestamp when the segment or media object is available.

##### 5.16.6.1.6 Data reporting at reference point M3d

The 5GMSd AS provides CMCD information to the 5GMSd AF at reference point M3d. To support this functionality, the following solution may be considered:

- Based on CMCD information conveyed using a CMCD query parameter or CMCD request headers in M4d requests, the 5GMSd AS submits a QoE metrics report to the 5GMSd AF using the CMCD JSON format specified in CTA-5004 [105].

In section 5 of this paper, a solution is proposed to include a new generic JSON-based metrics reporting envelope syntax for use as reference point M3d.

##### 5.16.6.1.7 Event exposure at reference point R5 and R6

The Data Collection AF instantiated in the 5GMSd AF exposes events to the Event Consumer AF of the 5GMSd Application Provider. To support this functionality, the following solution may be considered:

- Reuse event exposure mechanism per clause 4.7.4 of TS 26.501 [15] and clause 18 of TS 26.512 [16]. **A new collection data type and record data type need to be specified by the latter. Individual CMCD records are expressed using the JSON representation specified in CTA-5004 [105]. In addition, clause 5.6.2.6 of TS 29.517 [25] needs to be extended by CT3 to allow exposure of events containing this new type of record in an AfEventNotification.**

In section 5 of this paper, it is further detailed that the existing QoE metrics exposure data types can be reused, saving the need for changes to TS 29.517 and only minimal changes to TS 26.512.

##### 5.16.6.1.8 Functional changes to 5GMSd AF

Functionalities in the 5GMSd AF to process received CMCD information received, to use this information to initiate and re-configure media session handling functions in the 5G Core as needed, and to aggregate the information for delivery to the 5GMSd Application Provider [and/or to the OAM Server]. To support this functionality, the following solution may be considered:

- Data processing and event exposure for CMCD information per clauses 4.7.3 and 4.7.4 of TS 26.501 [15] and clause 18 of TS 26.512 [16] respectively.

NOTE: How data aggregation functions (count, mean, maximum, minimum, etc.) are applied to reported CMCD information is for further study.

##### 5.16.6.1.9 Functional changes to 5GMSd AS

Functionalities in the 5GMSd AS to extract and process CMCD information received from the Media Player via reference point M4d and:

1. Reformat it into the CMCD JSON format specified in CTA-5004 [105] and report it to the 5GMSd AF via reference point M3d.

2. Proactively request media segments from the 5GMSd Application Provider at reference point M2d, if this optional feature is supported.

##### 5.16.6.1.10 Functional changes to Media Player

Functionalities in the Media Player to report CMCD information to the 5GMSd AS at reference point M4d as part of media requests.

The CMCD specification [105] may need to be extended to add the timestamp when the next media object is available in order to fully support the pre-fetch optimisation described in step 7c of clause 5.16.4.

In addition, a metrics reporting configuration client API may additionally be needed at reference points M7/M11. The object stored in the metricsConfigurations[ ] array (table 13.2.4-1 of TS 26.512) is currently underspecified.

##### 5.16.6.1.11 Functional changes to Media Session Handler

Functionalities in the Media Session Handler to process CMCD configuration information and to instruct the Media Player via reference point M11d to initiate CMCD collection and reporting.

# Wire formats

## Introduction



Having received CMCD information in band with media requests at reference point M4d, it is agreed in clause 5.16.7 of TR 26.804 [3] that the 5GMS AS will use the existing QoE metrics reporting mechanism at reference point M3d to submit metrics reports (following a new JSON-based format) to the 5GMSd AF according to a metrics reporting configuration previously obtained from Service Access Information requested from the 5GMSd AF, also at reference point M3d.

The CMCD information received by the 5GMSd AF is extracted from these QoE metrics reports and may be used to influence the behaviour of the relevant media delivery session in the 5GMS System.

The CMCD information is also passed to the Data Collection AF, if instantiated in the 5GMSd AF, for exposure to the NWDAF via reference point R5 and/or to Event Consumers via R6. This paper investigates whether the existing event exposure data structures for QoE metrics are suitable for reuse in this context. Reusing these data structures would eliminate the need to specify new ones in TS 26.512 [2] as well as in downstream CT technical specifications.

## Approach A: Four different metrics schemes

In this approach, CMCD information is treated as four different metrics schemes when provisioned at reference point M1d, corresponding to the four different HTTP request headers used for reporting CMCD information at reference point M4d, but is not intended to signal the use of HTTP request headers rather than URL query parameters at that reference point:

|  |  |
| --- | --- |
| **Metrics scheme** | **Metrics scheme URI** |
| CMCD per-session information | *urn:3gpp:5gms:event-exposure:common-media-client-data:session* |
| CMCD per-object information | *urn:3gpp:5gms:event-exposure:common-media-client-data:object* |
| CMCD per-request information | *urn:3gpp:5gms:event-exposure:common-media-client-data:request* |
| CMCD status information | *urn:3gpp:5gms:event-exposure:common-media-client-data:status* |

The advantage of this approach is that a 5GMS Application Provider can provision only a subset of the different schemes using metrics reporting configurations. The **frequency of reporting** (at reference point M3) and/or **exposure** (at R5/R6) of the different schemes can also be provisioned independently at reference points M1d, M3d and M5d, and the Media Stream Handler is configured at M11d to report accordingly at M4d.

## Approach B: Single metrics scheme

In this approach, all CMCD information is treated as a single metrics scheme when provisioned at reference point M1d:

|  |  |
| --- | --- |
| **Metrics scheme** | **Metrics scheme URI** |
| CMCD information | *urn:3gpp:5gms:event-exposure:common-media-client-data* |

The advantage of this approach is simplicity at the expense of finer-grained configurability.

## Examples

### QoE metrics reporting at reference point M3

This section proposes a new **JSON-based reporting envelope** format supporting both Approach A and Approach B above.

The following example shows a single QoE metrics report that conveys five metrics samples: three containing per-session metrics; the other two containing per-request metrics. **The JSON formatting of the individual CMCD metrics is fully compliant with CTA-5004 [1].**

Since CMCD keys describe data at exactly one scope (session, request, object), a different object *type* is specified for each of these that contains only the relevant keys. All keys are optional to report.

The data types are designed to be generic, so that the same *MetricsReport* envelope could be reused to convey non-CMCD information in the future.

Example QoE metrics report for CMCD at reference point M3d

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Data type** | | | | **Example** | **Remarks** |
| MetricsReport | | | | { |  |
|  |  | | | "reportTimestamp": "2025-03-21T10:40:00Z", |  |
|  | | | "sessions": [ |  |
| MetricsSession | | | { |  |
|  |  |  | "sessionId": "4e730c95-df38-4ad0-9a0b-ece2217cbd3e", |  |
|  |  | "clientId": "447777123456", | GPSI, etc. |
|  |  | "externalServiceId": "uk.co.bbc.iplayer", | Reverse FQDN |
|  |  | "samples": [ |  |
| MetricsSample | | { |  |
|  |  | "sampleTimestamp": "2025-03-21T10:30:04", |  |
| CmcdSessionData | "cmcdSessionData": { |  |
| "cid": "p0jq4wk0", | Content ID |
| "pr": "1.0", | Playback rate |
| "sf": "d", | DASH |
| "sid": "4e730c95-df38-4ad0-9a0b-ece2217cbd3e", | Session ID |
| "st": "l", | Stream type |
| "v": "1" | CMCD v1 |
| }, |  |
| CmcdRequestData | "cmcdRequestData": { |  |
| "bl": "200", | Buffer length |
| "mtp": "1257", | Throughput |
| "nor": "video/segment0002.mp4" | Next object |
| } |  |
| }, |  |
| MetricsSample | | { |  |
|  |  | "sampleTimestamp": "2025-03-21T10:30:05", |  |
| CmcdRequestData | "cmcdRequestData": { |  |
| "bl": "300", | Buffer length |
| "mtp": "1253", | Throughput |
| "nor": "video/segment0002.mp4" | Next object |
| } |  |
| }, |  |
| MetricsSample | | { |  |
|  |  | "sampleTimestamp": "2025-03-21T10:30:14", |  |
| CmcdSessionData | "cmcdSessionData": { |  |
| "cid": "p0jq4wk0", | Content ID |
| "pr": "2.0", | Playback rate |
| "sf": "d", | DASH |
| "sid": "4e730c95-df38-4ad0-9a0b-ece2217cbd3e", | Session ID |
| "st": "l", | Stream type |
| "v": "1" | CMCD v1 |
| } |  |
|  | }, |  |
| MetricsSample | | { |  |
|  |  | "sampleTimestamp": "2025-03-21T10:30:20", |  |
| CmcdSessionData | "cmcdSessionData": { |  |
| "cid": "p0jq4wk0", | Content ID |
| "pr": "1.0", | Playback rate |
| "sf": "d", | DASH |
| "sid": "4e730c95-df38-4ad0-9a0b-ece2217cbd3e", | Session ID |
| "st": "l", | Stream type |
| "v": "1" | CMCD v1 |
| } |  |
|  |  | } |  |
|  |  | ] |  |
|  |  | } |  |
|  |  |  | ] |  |
|  |  |  | } |  |

### Event exposure to event consumers

Information is exposed to event consumers as a series of **events** carrying **time series** data. For this reason, CMCD information needs to be assembled into a coherent timeline by the Data Collection AF prior to exposure.

In the below example, the CMCD information at the start of a media streaming session is packed in to a single *AfEventNotification* (of type *MS\_QOE\_METRICS*), which contains a single *QoEMetricsCollection* object. There are two events present in this collection:

- A *QoEMetricsEvent* object conveying a time series of CMCD Session metrics.

- A *QoEMetricsEvent* object conveying a time series of CMCD Request metrics.

Note that the JSON format of the CMCD key–value pairs is *not* compliant with section 2.3 of CTA-5004 because it reuses the existing notification envelope format specified in TS 29.517 [4] and TS 26.512 [2] that is intended for consumption by the NWDAF and other event consumer subscribers.

Note also:

1. The optional *mediaTimestamp* property of *QoEMetricsEvent* cannot be populated from CMCD information, and is therefore omitted.

2. The optional *sampleDuration* property of *QoEMetricsEvent* is also omitted; CMCD information is considered instantaneous sample provided at the time of the M4d request.

Example QoE metrics event for CMCD exposed to event consumers (Approach A)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  | **Remarks** |
| AfEventExposureNotif | | | | | { |  |
|  |  | | | | "notifId": "0913937b-9fa9-4435-8c49-8d14bf4519b2", |  |
|  |  | | | | "eventNotifs": [ |  |
|  | AfEventNotification | | | | { |  |
|  |  |  | | | "event": "MS\_QOE\_METRICS", |  |
|  |  |  | | | "timeStamp": "2025-03-21T10:44:36Z", |  |
|  |  |  | | | "msQoeMetrics" : [ |  |
|  |  | QoEMetricsCollection | | | { |  |
|  |  |  |  | | "collectionTimestamp": "2025-03-21T10:40:00Z", |  |
|  |  |  |  | | "startTimestamp": "2025-03-21T10:30:00Z", |  |
|  |  |  |  | | "endTimestamp": "2025-03-21T10:39:59Z", |  |
|  |  |  |  | | "sampleCount": "2", | Number of event records? |
|  |  |  |  | | "streamingDirection": "MS\_DOWNLINK", |  |
|  |  |  |  | | "summarisations": "NONE", |  |
|  |  |  |  | | "records": [ |  |
|  |  |  | QoEMetricsEvent | | { |  |
|  |  |  |  |  | "recordType": "INDIVIDUAL\_SAMPLE", |  |
|  |  |  |  |  | "recordTimestamp": "2025-03-21T10:30:04", |  |
|  |  |  |  |  | "appId": "uk.co.bbc.iplayer.android", |  |
|  |  |  |  |  | "provisioningSessionId": "300ffa46-2b5d-441c-9766-9a6432c170c6", | Populated by reverse lookup of appId. |
|  |  |  |  |  | "sessionId": "4e730c95-df38-4ad0-9a0b-ece2217cbd3e", | Media delivery session ID |
|  |  |  |  |  | "ueIdentification": "447777123456", | GPSI, etc. |
|  |  |  |  |  | "dataNetworkName": "TS23.003clause9A", | Populated by reverse lookup in PCF, if possible. |
|  |  |  |  |  | "sliceId": {"sst": "128", "sd": "abcdef"}, |
|  |  |  |  |  | "ueLocations": [ |
|  |  |  |  | LocationArea5G | { |
|  |  |  |  |  | "civicAddresses": [ |
|  |  |  |  |  | {"country": "GBR"} |
|  |  |  |  |  | } |
|  |  |  |  |  | ], |
|  |  |  |  |  | "metricType": "urn:3gpp:5gms:event-exposure:common-media-client-data:session", |  |
|  |  |  |  |  | "samples" : [ |  |
|  |  |  |  |  | { |  |
|  |  |  |  |  | "sampleTimestamp": "2025-03-21T10:30:04", |  |
|  |  |  |  |  | "mediaTimestamp": "PT0S", |  |
|  |  |  |  |  | "metrics": [ |  |
|  |  |  |  |  | { "key": "cid", "value": "p0jq4wk0" }, |  |
|  |  |  |  |  | { "key": "pr", "value": "1.0" }, | Playing |
|  |  |  |  |  | { "key": "sf", "value": "d" }, |  |
|  |  |  |  |  | { "key": "sid", "value": "4e730c95-df38-4ad0-9a0b-ece2217cbd3e" }, |  |
|  |  |  |  |  | { "key": "st", "value": "l" }, |  |
|  |  |  |  |  | { "key": "v", "value": "l" } | CMCD v1 |
|  |  |  |  |  | ] |  |
|  |  |  |  |  | }, |  |
|  |  |  |  |  | { |  |
|  |  |  |  |  | "sampleTimestamp": "2025-03-21T10:30:14", |  |
|  |  |  |  |  | "mediaTimestamp": "PT0S", |  |
|  |  |  |  |  | "metrics": [ |  |
|  |  |  |  |  | { "key": "cid", "value": "p0jq4wk0" }, |  |
|  |  |  |  |  | { "key": "pr", "value": "2.0" }, | Seeking |
|  |  |  |  |  | { "key": "sf", "value": "d" }, |  |
|  |  |  |  |  | { "key": "sid", "value": "4e730c95-df38-4ad0-9a0b-ece2217cbd3e" }, |  |
|  |  |  |  |  | { "key": "st", "value": "l" }, |  |
|  |  |  |  |  | { "key": "v", "value": "l" } | CMCD v1 |
|  |  |  |  |  | ] |  |
|  |  |  |  |  | }, |  |
|  |  |  |  |  | { |  |
|  |  |  |  |  | "sampleTimestamp": "2025-03-21T10:30:20", |  |
|  |  |  |  |  | "mediaTimestamp": "PT7M14S", |  |
|  |  |  |  |  | "metrics": [ |  |
|  |  |  |  |  | { "key": "cid", "value": "p0jq4wk0" }, |  |
|  |  |  |  |  | { "key": "pr", "value": "1.0" }, | Playing |
|  |  |  |  |  | { "key": "sf", "value": "d" }, |  |
|  |  |  |  |  | { "key": "sid", "value": "4e730c95-df38-4ad0-9a0b-ece2217cbd3e" }, |  |
|  |  |  |  |  | { "key": "st", "value": "l" }, |  |
|  |  |  |  |  | { "key": "v", "value": "l" } | CMCD v1 |
|  |  |  |  |  | ] |  |
|  |  |  |  |  | } |  |
|  |  |  |  |  | ] |  |
|  |  |  |  |  | }, |  |
|  |  |  | QoEMetricsEvent | | { |  |
|  |  |  |  |  | "recordType": "INDIVIDUAL\_SAMPLE", |  |
|  |  |  |  |  | "recordTimestamp": "2025-03-21T10:30:04", |  |
|  |  |  |  |  | "appId": "uk.co.bbc.iplayer.android", |  |
|  |  |  |  |  | "provisioningSessionId": "300ffa46-2b5d-441c-9766-9a6432c170c6", |  |
|  |  |  |  |  | "sessionId": "4e730c95-df38-4ad0-9a0b-ece2217cbd3e", |  |
|  |  |  |  |  | "ueIdentification": "447777123456", |  |
|  |  |  |  |  | "dataNetworkName": "TS23.003clause9A", |  |
|  |  |  |  |  | "sliceId": {"sst": "128", "sd": "abcdef"}, |  |
|  |  |  |  |  | "ueLocations": { |  |
|  |  |  |  |  | { |  |
|  |  |  |  |  | "civicAddresses": [ |  |
|  |  |  |  |  | {"country": "GBR"} |  |
|  |  |  |  |  | ] |  |
|  |  |  |  |  | } |  |
|  |  |  |  |  | ], |  |
|  |  |  |  |  | "metricType": "urn:3gpp:5gms:event-exposure:common-media-client-data:request", |  |
|  |  |  |  |  | "samples" : [ |  |
|  |  |  |  |  | { |  |
|  |  |  |  |  | "sampleTimestamp": "2025-03-21T10:30:04", |  |
|  |  |  |  |  | "sampleDuration": "PT1S", |  |
|  |  |  |  |  | "mediaTimestamp": "PT0S", |  |
|  |  |  |  |  | "metrics": [ |  |
|  |  |  |  |  | { "key": "bl", "value": "200" }, |  |
|  |  |  |  |  | { "key": "mtp", "value": "1257" }, |  |
|  |  |  |  |  | { "key": "nor", "value": "video/segment0002.mp4" } |  |
|  |  |  |  |  | ] |  |
|  |  |  |  |  | }, |  |
|  |  |  |  |  | { |  |
|  |  |  |  |  | "sampleTimestamp": "2025-03-21T10:30:05", |  |
|  |  |  |  |  | "sampleDuration": "PT1S", |  |
|  |  |  |  |  | "mediaTimestamp": "PT1S", |  |
|  |  |  |  |  | "metrics": [ |  |
|  |  |  |  |  | { "key": "bl", "value": "300" }, |  |
|  |  |  |  |  | { "key": "mtp", "value": "1253" }, |  |
|  |  |  |  |  | { "key": "nor", "value": "video/segment0002.mp4" } |  |
|  |  |  |  |  | ] |  |
|  |  |  |  |  | } |  |
|  |  |  |  |  | ] |  |
|  |  |  |  |  | } |  |
|  |  |  |  |  | ] |  |
|  |  |  |  |  | } |  |
|  |  |  |  |  | ] |  |
|  |  |  |  |  | } |  |
|  |  |  |  |  | ] |  |
|  |  |  |  |  | } |  |

With Approach B, all metrics belong to the same namespace (*urn:3gpp:5gms:event-exposure:common-media-client-data*), so the metrics samples can be packed more efficiently into the same enclosing *QoEMetricsEvent* record. However, the key name of each metric is more verbose to reflect its scope.

Example QoE metrics event for CMCD exposed to event consumers (Approach B)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  | **Remarks** |
| AfEventExposureNotif | | | | | { |  |
|  |  | | | | "notifId": "0913937b-9fa9-4435-8c49-8d14bf4519b2", |  |
|  |  | | | | "eventNotifs": [ |  |
|  | AfEventNotification | | | | { |  |
|  |  |  | | | "event": "MS\_QOE\_METRICS", |  |
|  |  |  | | | "timeStamp": "2025-03-21T10:44:36Z", |  |
|  |  |  | | | "msQoeMetrics" : [ |  |
|  |  | QoEMetricsCollection | | | { |  |
|  |  |  |  | | "collectionTimestamp": "2025-03-21T10:40:00Z", |  |
|  |  |  |  | | "startTimestamp": "2025-03-21T10:30:00Z", |  |
|  |  |  |  | | "endTimestamp": "2025-03-21T10:39:59Z", |  |
|  |  |  |  | | "sampleCount": "1", | Number of event records? |
|  |  |  |  | | "streamingDirection": "MS\_DOWNLINK", |  |
|  |  |  |  | | "summarisations": "NONE", |  |
|  |  |  |  | | "records": [ |  |
|  |  |  | QoEMetricsEvent | | { |  |
|  |  |  |  |  | "recordType": "INDIVIDUAL\_SAMPLE", |  |
|  |  |  |  |  | "recordTimestamp": "2025-03-21T10:30:04", |  |
|  |  |  |  |  | "appId": "uk.co.bbc.iplayer.android", | Populated by reverse lookup in Provisioning Session |
|  |  |  |  |  | "provisioningSessionId": "uk.co.bbc.iplayer", |  |
|  |  |  |  |  | "sessionId": "4e730c95-df38-4ad0-9a0b-ece2217cbd3e", |  |
|  |  |  |  |  | "ueIdentification": "447777123456", | Populated by reverse lookup in PCF. |
|  |  |  |  |  | "dataNetworkName": "TS23.003clause9A", |
|  |  |  |  |  | "sliceId": {"sst": "128", "sd": "abcdef"}, |
|  |  |  |  |  | "ueLocations": [ |
|  |  |  |  | LocationArea5G | { |
|  |  |  |  |  | "civicAddresses": [ |
|  |  |  |  |  | {"country": "GBR"} |
|  |  |  |  |  | } |
|  |  |  |  |  | ], |
|  |  |  |  |  | "metricType": "urn:3gpp:5gms:event-exposure:common-media-client-data", |  |
|  |  |  |  |  | "samples" : [ |  |
|  |  |  |  |  | { |  |
|  |  |  |  |  | "sampleTimestamp": "2025-03-21T10:30:04", |  |
|  |  |  |  |  | "mediaTimestamp": "PT0S", |  |
|  |  |  |  |  | "metrics": [ |  |
|  |  |  |  |  | { "key": "session/cid", "value": "p0jq4wk0" }, |  |
|  |  |  |  |  | { "key": "session/pr", "value": "1.0" }, | Playing |
|  |  |  |  |  | { "key": "session/sf", "value": "d" }, |  |
|  |  |  |  |  | { "key": "session/sid", "value": "4e730c95-df38-4ad0-9a0b-ece2217cbd3e" }, |  |
|  |  |  |  |  | { "key": "session/st", "value": "l" }, |  |
|  |  |  |  |  | { "key": "session/v", "value": "l" } | CMCD v1 |
|  |  |  |  |  | ] |  |
|  |  |  |  |  | }, |  |
|  |  |  |  |  | { |  |
|  |  |  |  |  | "sampleTimestamp": "2025-03-21T10:30:14", |  |
|  |  |  |  |  | "mediaTimestamp": "PT0S", |  |
|  |  |  |  |  | "metrics": [ |  |
|  |  |  |  |  | { "key": "session/cid", "value": "p0jq4wk0" }, |  |
|  |  |  |  |  | { "key": "session/pr", "value": "2.0" }, | Seeking |
|  |  |  |  |  | { "key": "session/sf", "value": "d" }, |  |
|  |  |  |  |  | { "key": "session/sid", "value": "4e730c95-df38-4ad0-9a0b-ece2217cbd3e" }, |  |
|  |  |  |  |  | { "key": "session/st", "value": "l" }, |  |
|  |  |  |  |  | { "key": "session/v", "value": "l" } | CMCD v1 |
|  |  |  |  |  | ] |  |
|  |  |  |  |  | }, |  |
|  |  |  |  |  | { |  |
|  |  |  |  |  | "sampleTimestamp": "2025-03-21T10:30:20", |  |
|  |  |  |  |  | "mediaTimestamp": "PT7M14S", |  |
|  |  |  |  |  | "metrics": [ |  |
|  |  |  |  |  | { "key": "session/cid", "value": "p0jq4wk0" }, |  |
|  |  |  |  |  | { "key": "session/pr", "value": "1.0" }, | Playing |
|  |  |  |  |  | { "key": "session/sf", "value": "d" }, |  |
|  |  |  |  |  | { "key": "session/sid", "value": "4e730c95-df38-4ad0-9a0b-ece2217cbd3e" }, |  |
|  |  |  |  |  | { "key": "session/st", "value": "l" }, |  |
|  |  |  |  |  | { "key": "session/v", "value": "l" } | CMCD v1 |
|  |  |  |  |  | ] |  |
|  |  |  |  |  | }, |  |
|  |  |  |  |  | { |  |
|  |  |  |  |  | "sampleTimestamp": "2025-03-21T10:30:04", |  |
|  |  |  |  |  | "sampleDuration": "PT1S", |  |
|  |  |  |  |  | "mediaTimestamp": "PT0S", |  |
|  |  |  |  |  | "metrics": [ |  |
|  |  |  |  |  | { "key": "request/bl", "value": "200" }, | Buffer length |
|  |  |  |  |  | { "key": "request/mtp", "value": "1257" }, | Throughput |
|  |  |  |  |  | { "key": "request/nor", "value": "video/segment0002.mp4" } | Next object |
|  |  |  |  |  | ] |  |
|  |  |  |  |  | }, |  |
|  |  |  |  |  | { |  |
|  |  |  |  |  | "sampleTimestamp": "2025-03-21T10:30:05", |  |
|  |  |  |  |  | "sampleDuration": "PT1S", |  |
|  |  |  |  |  | "mediaTimestamp": "PT1S", |  |
|  |  |  |  |  | "metrics": [ |  |
|  |  |  |  |  | { "key": "request/bl", "value": "300" }, | Buffer length |
|  |  |  |  |  | { "key": "request/mtp", "value": "1253" }, | Throughput |
|  |  |  |  |  | { "key": "request/nor", "value": "video/segment0002.mp4" } | Next object |
|  |  |  |  |  | ] |  |
|  |  |  |  |  | } |  |
|  |  |  |  |  | ] |  |
|  |  |  |  |  | } |  |
|  |  |  |  |  | ] |  |
|  |  |  |  |  | } |  |
|  |  |  |  |  | ] |  |
|  |  |  |  |  | } |  |
|  |  |  |  |  | ] |  |
|  |  |  |  |  | } |  |

# Agreements

It is agreed that SA4 specifies the following in TS 26.512:

1. In a new clause E.2.3, four new metrics schemes for reporting CMCD information based on **Approach A**, as described above.

2. In a new clause 17B and C.5.3, a **JSON-based QoE metrics reporting envelope** with a syntax similar to that shown in section 3.1, to be used in the first instance to convey CMCD information at reference point M3d.

- This would potentially be better specified instead in a new clause 12 to TS 26.510 [5] so that it can be used more generally by other media delivery systems, such as RTC. In this case, the YAML syntax of the top-level elements are instead added to TS26510\_‌Maf\_SessionHandling\_‌MetricsReporting.yaml.

3. In a new annex, register a MIME content type for the new JSON-based QoE metrics reporting envelope, e.g. *application/3gpp-media-delivery-qoe-report+json*.

- Again, this would potentially be better specified instead in a new annex to TS 26.510 [5] so that it can be used more generally by other media delivery systems, such as RTC.

4. In clause 4.5, stage-3 procedures used by the 5GMS AS to obtain a client metrics reporting configuration in Service Access Information retrieved from the 5GMS AF at reference point M3d (similar to clause 4.7.5).

5. In clause 4.5, stage-3 procedures used by the 5GMS AS to submit metrics reports to the 5GMS AF at reference point M3d using the new JSON-based envelope (similar to clause 4.7.2).

6. In clauses 9.4 and 9.5, extend the Content Hosting Configuration and Content Publishing Configuration data models (used to configure the 5GMS AS at reference point M3d/M3u respectively) to include the **external service identifier** of the parent Provisioning Session so that this value can be included in QoE metrics reports using the new JSON-based QoE metrics reporting envelope.

7. Generalisation of the applicability of the **Media Session Handling API** in clause 11 to cover usage by the 5GMS AS at reference point M3 (in addition to the existing usage by the Media Session Handler at M5).

8. In clause 11.4.1, details of the three new metrics schemes.

9. In clause 11.4.3, details of the new JSON-based metrics reporting envelope.

10. In clause 18.3, instructions on how to pack CMCD information into the existing ***QoEMetricsEvent* record data type**, for inclusion in a *QoEMetricsCollection*.

# Work Plan

To be completed

# Proposal

It is proposed to:

* Progress the work during SA4#131-bis-e and identify relevant CRs
  + A CR to TS 26.510
  + A CR to TS 26.512
  + At this stage no CR for TS 26.247 seems to be needed
* Initiate the work during the AHG period for SA4#132