**3GPP TSG- Meeting #**

**, , - revision of S4aI230003**

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| *CR-Form-v12.2* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
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|  |  | **CR** |  | **rev** |  | **Current version:** |  |  |
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| *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)*.* | | | | | | | | |
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| ***Proposed change affects:*** | UICC apps |  | ME | **X** | Radio Access Network |  | Core Network | **X** |

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| ***Title:*** |  | | | | | | | | | |
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| ***Source to WG:*** |  | | | | | | | | | |
| ***Source to TSG:*** | S4 | | | | | | | | | |
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| ***Work item code:*** |  | | | | |  | ***Date:*** | | | 2023/02/14 |
|  |  | | | |  | |  | | |  |
| ***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:*** | | The work item in SP-220614 asks among others for the following:   * Hybrid DASH/HLS operation   Updating existing call flows and procedures to support hybrid DASH/HLS delivery in 5GMS architecture | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | The CR addresses the above objectives by adding:   * New References * The possibility to have multiple formats for a session including multiple presentation formats * Extension of architecture * Procecures for downlink streaming * Updates to Media ingest procedures | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | Work Item objectives not complete | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 2, 4.2.3, 4.X (new), 5.2.X (new), 5.4.2 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **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:*** | | **Draft CRs Revision 1 in S4-221141 was agreed as basis for future work**  **Draft CRs Revision 2 in S4aI221372 just cleans the agreements in S4-221141 and is proposed as basis for future work during the telcos.**   |  |  |  |  | | --- | --- | --- | --- | | [**S4aI221373**](https://www.3gpp.org/ftp/TSG_SA/WG4_CODEC/3GPP_SA4_AHOC_MTGs/SA4_MBS/Docs/S4aI221373.zip) | [5GMSA\_Ph2] Downlink Streaming to Media Players with different Manifests | Qualcomm incorporated | Thomas Stockhammer |   **Revisions**   * none   **Presenter**: Thomas Stockhammer (Qualcomm)  **Discussion**:   * Thomas: Based on S4-221141, previously agreed as the basis for further work, again with basic cleaning. Forgot to accept changes to make it easier to see future modifications.   **Decision**:   * Agreed as the basis for further work. Author will continue working on this contribution.   **S4aI221373** is **agreed.**   |  |  |  |  | | --- | --- | --- | --- | | [**S4-221309**](https://www.3gpp.org/ftp/tsg_sa/WG4_CODEC/TSGS4_121_Toulouse/Docs/S4-221309.zip) | [5GMSA\_Ph2] Downlink Streaming to Media Players with Different Manifests | Qualcomm incorporated | Thomas Stockhammer |   **Presenter:** Thomas Stockhammer (Qualcomm)  **Online Discussion:**   * None.   **Decision:**   * Agreed as basis for further work.   [**S4-221309**](https://www.3gpp.org/ftp/tsg_sa/WG4_CODEC/TSGS4_121_Toulouse/Docs/S4-221309.zip)is **endorsed.**  **This revision addresses further updates.**   |  |  |  |  | | --- | --- | --- | --- | | [S4aI230003](https://www.3gpp.org/ftp/TSG_SA/WG4_CODEC/3GPP_SA4_AHOC_MTGs/SA4_MBS/Docs/S4aI230003.zip) | [5GMSA\_Ph2] Downlink Streaming to Media Players with Different Manifests | Qualcomm incorporated | Thomas Stockhammer |   **E-mail Discussion**: none; Charles mentioned he provided private comments to Thomas  **Revisions**: none  **Presenter**: Thomas Stockhammer (Qualcomm)  **Online Discussion**:   * Richard: Is this CR targeting Rel-18? A: yes * Richard: nothing in scope of 5GMS over MBS previously? Thomas: yes this is a gap * Richard: Doable for both CMAF and non CMAF case; for non-CMAF there could be a single content ingest but that content gets converted to different formats inside the AS * Thorsten: Steps 5 and 6 in call flow 5.2.X-1, my view is that the smart phone is either HLS capable or DASH capable. Can a preference be provided - e.g. please use DASH. Is this the only sequence or is this an example sequence to always ask the application what is the preference? Thomas: There may be other alternatives. The Service Access information needs to provide multiple entries. * Thorsten: do we assume default support for single type of media player or multiple players? * Thomas: both are possible/allowed. * Throsten: Media Session Handler might not need to query the Application but instead the Media Player on media player capabilities * Charles: You say media player entries could be DASH or HLS playlists, or just be the URL of the resource locators of specific piece of content. Thomas: The initial semantics of media player entries is not changed. Maybe the legacy text is wrong in Table 4.2.3-1a. Maybe it should only be pointers rather than full documents. * Charles: It is a little unclear. Maybe it could be improved. * Richard: Agree with M5 Service access information provides all media player entries. Maybe the MSH is actually serving multiple media players installed with different capabilities. SO, allowing clients to do capability exchange is understandable. * Thomas: Maybe reading RIchard contribution and combining it is a right direction. The issue of multiple manifests is actually a subset.   **Decision**:   * Work further on the document and look at Richard’s contribution   **S4aI230003** is **noted.**   |  |  |  |  | | --- | --- | --- | --- | | [S4aI230020](https://www.3gpp.org/ftp/TSG_SA/WG4_CODEC/3GPP_SA4_AHOC_MTGs/SA4_MBS/Docs/S4aI230020.zip) | [5GMS\_Ph2] Discussion on associating multiple media entry points with a 5GMS distribution configuration | BBC | Richard Bradbury |   **E-mail Discussion**:   |  |  |  | | --- | --- | --- | | [Comments on 020 [5GMS\_Ph2] Discussion on associating multiple media entry points with a 5GMS distribution configuration](https://list.etsi.org/scripts/wa.exe?A2=3GPP_TSG_SA_WG4_MBS;9c686135.2302B&S=) | Thomas Stockhammer | Thu, 9 Feb 2023 12:07:06 +0000 |   **Revisions**:  https://www.3gpp.org/ftp/TSG\_SA/WG4\_CODEC/3GPP\_SA4\_AHOC\_MTGs/SA4\_MBS/Inbox/Drafts/S4aI230022%20Discussion%20on%20Service%20URLs%20and%20Media%20Session%20Handler%20launching\_QCOM.docx  **Presenter**: Richard Bradbury (BBC)  **Online Discussion**:   * Imed: It would be good to see CR. We proposed similar CR. It will be good address these gaps. Any reason why we cannot go back to Rel-16? Richard: Do you think we could justify going back to Rel-16? Imed: If it breaks existing deployments we should not go, otherwise we should go back. Chairman: Formally we cannot go back. Rel-16 is frozen. Imed: If this a correction? Chairman: Not questioning the validity, there may be risk going back to Rel-16. * Imed: What if there are multiple pieces of content? Richard: My assumption is that for those cases we would not specify any entry points at all. We give the catalog through M8 instead. Imed: This could be misused for the use cases with multiple pieces of content.   **Decision**:   * Agreed for Rel-17.   **S4aI230020** is **agreed.** | | | | | | | | |

**===== CHANGE =====**

# 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*.

[X] CTA-5005: "Web Application Video Ecosystem – DASH-HLS Interoperability Specification".

[26.511] 3GPP TS 26.511: "5G Media Streaming (5GMS); Profiles, Codecs and Formats".

[CMAF] ISO/IEC 23000-19: "Information Technology Multimedia Application Format (MPEG-A) – Part 19: Common Media Application Format (CMAF) for segmented media".

[HLS] IETF RFC 8216: "HTTP Live Streaming".

[DASH] ISO/IEC 23009-1: "Information Technology - Dynamic Adaptive Streaming Over HTTP (DASH) - Part 1: Media Presentation Description and Segment Formats".

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### 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. 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 MBMS Client, including content type, profile indicators and precedence. |
| 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. |
| 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. |

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## 4.X Downlink streaming to Media Players with multiple formats

### 4.X.1 General

This clause considers downlink streaming in which a 5GMSd Application Provider publishes the same service in different media formats, all to be ingested by the same logical 5GMSd AS. The different media formats of the service are described by different presentation manifests (e.g. Dynamic Adaptive Streaming over HTTP [DASH] and HTTP Live Streaming [HLS]) but are described by a common Content Hosting Configuration (see clause 5.4) under a single Provisioning Session (see clause 5.3). The different media formats may or may not share the media resources described by their respective presrentation manifests.

Where the different media formats do share the same media objects(for example, an ISO MPEG Common Media Application Format (CMAF) presentation [CMAF] according to the content format specified in TS 26.511 [26.511]) the same CMAF content may then provided to different kinds of Media Player, for example HTTP Live Streaming [HLS] and Dynamic Adaptive Streaming over HTTP [DASH], requiring different presentation manifest formats. This approach is aligned with CTA-5005 [X], which primarily focusses on creating interoperable CMAF content such that it can be used at the same time with DASH and HLS to the greatest possible extent.

The deployment architecture for this scenario is documented in figure 5.4.3-1. In this case, the 5GMSd Application Provider provisions a single downlink media streaming session and triggers the content to be served to 5GMS Clients that consume different media formats, indicated in the figure with an asterisk.

- Provisioning and content ingest shall support the ability to serve different formats.

- Provisioning and content ingest shall support the possibility that different formats may share common media files, for example CMAF to be used for DASH and HLS.



Figure 5.4.3-1: Deployment architecture for downlink streaming to Media Players with different formats

### 4.X.2 Extensions to 5G Media Downlink Streaming for downlink streaming to Media Players with different presentation manifests

Editor’s Note: tbd

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### 5.2.X Procedures for downlink streaming to Media Players with different presentation manifests

Figure 5.2.X-1 illustrates a high-level procedure for downlink streaming to Media Players with different presentation manifests. The extensions compared to the DASH streaming in clause 5.2.2 are indicated in bold.

The procedure makes the following assumptions:

- Common media segments (e.g. based on CMAF [CMAF]) are shared between multiple Media Players requiring different presentation formats (see clause 4.X.1).

- Key information to initialize the media decoding and rendering pipeline is present in the Media Player Entries (or referenced by the Media Player Entries).



Figure 5.2.X-1: High-level procedure for CMAF content shared by different Media Players

Prerequisites:

- The 5GMSd Application Provider has provisioned the 5G Media Streaming System, including content hosting.

Steps:

1: The 5GMSd-Aware Application triggers the Service Announcement and Service and Content Discovery procedurewith the 5GMSd Application Provider. The Service Announcement includes either the whole Service Access Information (i.e. details for Media Session Handling (M5d) and for Media Streaming access (M4d)) or a reference to the Service Access Information.

2: A media content item is selected.

3: The 5GMSd-Aware Application triggers the 5GMSd Client to initiate the **5G Media Streaming Service**.

4: When the 5GMS-Aware Application has received only a reference to the Service Access Information (see step 1), the Media Session Handler interacts with the 5GMSd AF to acquire the whole Service Access Information. **The Service Access Information may include multiple Media Entry Points**.

**5:** **The Media Session Handler provides the Media Entry Points to the 5GMS-Aware Application. The information may indicate a precedence order for these,**

**6: The 5GMSd-Aware Application queries the Media Player capabilities for different manifests. If multiple streaming formats are supported, a preferred one may be indicated in the response.**

**7: The 5GMSd-Aware Application selects one of the Media Entry Points based on the information provided in steps 5 and 6 above.**

**8: The 5GMSd-Aware Application informs the Media Session Handler about the streaming format of the chosen Media Entry Point.**

9: In parallel, the Media Player is invoked with the **selected Media Entry Point** to start media access and playback.

Steps 10 to 23 are identical to steps 6 to 19, respectively, in clause 5.2.2.

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### 5.4.2 Media ingest procedure

The media ingest procedure is illustrated in figure 5.4‑1:



Figure 5.4-1: Media Ingest procedure

The steps are as follows:

1: *Initialization:* the 5GMSd Application Provider discovers the entry point and authenticates itself with the 5GMSd AF.

2: *Create Content Hosting Configuration:* the 5GMSd Application Provider creates a new Content Hosting Configuration for all media formats of its content through the 5GMSd AF. The configuration specifies a domain name, supplies a certificate for HTTPS access to the content, sets the caching rules per media type, indicates the distribution area (e.g. through geofencing), distribution protocol, the desired content preparation, URL signing, etc. Upon successful configuration, the 5GMSd AF responds with a Content Hosting Configuration identifier, and the location of the 5GMSd AS to which to send the content (if using the push mode).

3: *Provision 5GMSd AS(s):* The 5GMSd AF configures the related 5GMSd AS(s) to prepare for media ingest for that particular Content Hosting Configuration. This step may involve instructing the 5GMSd AS(s) to set appropriate caching rules, to perform URL signature validation and to limit access through geofencing. The 5GMSd AS(s) will respond whether the configuration is successful or not.

In case of partial failure, the configuration shall be removed from all 5GMS AS(s) that succeeded.

4: *Confirm configuration information:* The 5GMSd AF communicates the Content Hosting Configuration of the 5GMSd AS(s) back to the 5GMSd Application Provider for further media push or pull.

In the case where not all requested media formats could be accommodated during the previous step, the 5GMSd AF shall indicate these in the failure response.

5: *Publish Media Player Entries:* The 5GMSd Application Provider shall then publish the Media Player Entries to the 5GMSd-Aware Application to enable access to the content, possibly in different formats.

6: *Media ingest:* The 5GMSd AS(s) may start pulling or receiving content (if using push mode) from the 5GMSd Application Provider. The 5GMSd AS performs the requested content preparation prior to providing access to the content.

NOTE: Pull of media content from the external 5GMSd AS(s) may be triggered by a request from the 5MGSd Client.

The 5GMSd Application Provider may update a Content Hosting Configuration subsequently to modify some of its parameters. The subset of parameters that can be updated may be limited by the 5GMSd AF.