**3GPP TSG-S4 Meeting # 130**

Orlando (FL,US), 18-22 November 2024 revision of S4-241661

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| *CR-Form-v12.2* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
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|  | **804** | **CR** | **0009** | **rev** | **5** | **Current version:** | 18.1.0 |  |
|  | | | | | | | | |
| *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)*.* | | | | | | | | |
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| ***Proposed change affects:*** | UICC apps |  | ME | **X** | Radio Access Network |  | Core Network | **X** |

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| ***Title:*** | FS\_AMD: WT2: Common Service- and Network-Assisted Streaming | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Tencent | | | | | | | | | |
| ***Source to TSG:*** | S4 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | FS\_AMD | | | | |  | ***Date:*** | | | 24-11-22 |
|  |  | | | |  | |  | | |  |
| ***Category:*** |  |  | | | | | ***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 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:*** | | Adding depoloyment scenarios. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | Two deployment scenarios are described. One additional one is listed for completeness but not proposed to be studied. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | Lack of support | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 2; 5.17 (new) | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  | **X** | Other core specifications | | | |  | | |
| ***affected:*** | |  | **X** | Test specifications | | | |  | | |
| ***(show related CRs)*** | |  | **X** | O&M Specifications | | | |  | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

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| **1st Change** |

# 2 References

[ETSI-CS] ETSI TS 103 998: "Publicly Available Specification (PAS); DASH-IF: Content Steering for DASH", http://www.etsi.org/deliver/etsi\_ts/103900\_103999/103998/01.01.01\_60/ts\_103998v010101p.pdf

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| **2nd Change** |

## 5.17 Common server-and network-assisted streaming

### 5.17.1 Description

The clause describes common server- and network-assisted streaming scenarios that leverage content steering mechanisms for efficient content delivery. These scenarios address both internal and external collaboration models, emphasizing optimized delivery paths, latency reduction, and bandwidth efficiency. The references include ETSI TS 103 998 [ETSI-CS] for content steering in DASH environments, ensuring alignment with industry standards.

### 5.17.2 Collaboration Scenarios

#### 5.17.2.1 Content steering and distribution inside the trusted domain

In this collaboration, content steering is provided by the Mobile Network Operator between various distribution networks (internal CDNs). The content steering server also exists inside the trusted DN. Figure 5.17.2.1-1 shows such a scenario.

UE

5GMSd

Client

5GMSd-Aware Application

5GMSd AS

External DN

5GMSd

Application Provider

M1d

M2d

Trusted DN

M4d

5GMSd AF

M5d

PCF

M8d

N5

Steering Server

Instance 1

Instance 2

Figure 5.17.2.1-1: Content steering inside Trusted DN

In this case:

1 The MNO provides multiple 5GMSd AS instances to deliver the content to/from the UE at reference point M4d.

2 The MNO also provides a content steering server as part of the 5GMSd AS.

3 The presentation manifest published by the 5GMSd Application Provider at reference point M2d does not include any content steering information. The MNO manipulates the manifest by adding Base URLs, as well as the steering server information, before providing it the 5GMSd Client at reference point M2d.

4 During streaming, the UE makes requests to the content steering server based on the information provided. The content steering operation is internal to the MNO and opaque to the 5GMSd Application Provider.

#### 5.17.2.2 Content steering outside the trusted domain with mixed content delivery inside and outside

In this collaboration, content steering is provided by an outside entity in the external DN steers the UE to get the content among multiple delivery networks, which one of them is the MNO network. Figure 5.17.2.2-1 shows such a scenario.

UE

5GMSd

Client

5GMSd-Aware Application

5GMSd AS

External DN

5GMSd

Application Provider

M1d

M2d

Trusted DN

M4d

5GMSd AF

M5d

PCF

M8d

N5

Steering Server

Instance 1

Distribution Server Ext

Figure 5.17.2.2-1: Content steering outside Trusted DN

In this case:

1 The MNO provides a 5GMSd AS for delivering the content to/from the UE. The same content is also available from other distribution networks outside the MNO’s trusted DN. The 5GMSd Application Provider has the information of the external distribution networks. The existence and nature of these networks are not necessarily known to the MNO.

2 The content steering server is also located in the external DN.

3 The 5GMSd Application Provider provides a presentation manifest at reference point M2d that contains Base URLs for the MNO’s 5GMSd AS as well as the external distribution networks and also information regarding the content steering service.

4 The 5GMSd Client may use the MNO’s 5GMSd AS at reference point M4d, or an external network depending on the content steering server’s responses.

#### 5.17.2.3 Content steering outside and content delivery inside trusted domain

In this collaboration, content steering provided by an outside entity in the external DN steers the UE to retrieve content from multiple 5GMSd AS instances, all of which are deployed in the Trusted DN of the MNO. Figure 5.17.2.3-1 shows such a scenario.

UE

5GMSd

Client

5GMSd-Aware Application

5GMSd AS

External DN

5GMSd

Application Provider

M1d

M2d

Trusted DN

M4d

5GMSd AF

M5d

PCF

M8

N5

Steering Server

Instance 1

Instance 2

Figure 5.17.2.3-1: Content steering outside of Trusted DN while distribution networks inside Trusted DN

In this case:

1 The MNO provides 5GMSd AS instances for delivering the content to/from the UE.

2 The 5GMSd Application Provider has the information about the MNO 5GMSd AS instances.

3 The content steering server is located in the external DN.

4 The Application Provider provides a presentation manifest at reference point M2d that contains Base URLs for the MNO’s 5GMSd AS instances, as well as the information regarding the external content steering service.

5 The 5GMSd Client uses one of the MNO’s 5GMSd AS instances at reference point M4d depending on the content steering server’s responses.

#### 5.17.2.4 Content steering inside and content delivery insider and outside of the trusted domain

In this collaboration, content steering provided by the MNO. But at least one of distribution networks exists outside of the trusted network. Figure 5.17.2.3-1 shows such a scenario.

UE

5GMSd

Client

5GMSd-Aware Application

5GMSd AS

External DN

5GMSd

Application Provider

M1d

M2d

Trusted DN

M4d

5GMSd AF

M5d

PCF

M8d

N5

Ext. Distribution Server

Instance 1

Steering Server

Figure 5.17.2.4-1: Content steering inside Trusted DN while one distribution server outside of Trusted DN

In this case:

1 The MNO provides some of 5GMSd AS instances for delivering the content to/from the UE.

2 The 5GMSd Application Provider has the information of the MNO 5GMSd AS instances.

3 The content steering server is provided by MNO.

4 The Application Provider provides a presentation manifest at reference point M2d that contains Base URLs for the MNO’s 5GMSd AS instances as well as the external content servers’ Base URLs.

5 The 5GMSd Client selects one of the content servers at reference point M4d or the external content server(s) depending on the content steering server’s responses.

### 5.17.3 Architecture mapping

Figures 5.17.2.1-1, 5.17.2.2-1, 5.17.2.3-1 and 5.17.2.4-1 depict the mapping to existing 5G frameworks with enhancements to support content steering across different scenarios:

- **Trusted domain only**: Within the MNO's trusted domain, the architecture includes multiple 5GMSd AS service locations/endpoints interconnected via reference points M4d and M8d. The content steering server dynamically assigns delivery paths. Steering is accomplished by having the DASH client periodically access a content steering server to retrieve a steering manifest, which instructs the player as to the availability and priority of the service locations/endpoints.

- **Hybrid trusted and external domains**: For scenarios where delivery spans both trusted and external domains, the steering server interfaces with external DN and the UE on interfaces out of 3GPP scope. Inter-domain metadata exchange ensures proper selection between trusted 5GMSd AS endpoints/locations and external CDNs based on factors such as load balancing, geolocation, and service-level agreements.

### 5.17.4 High-level call flow

The high-level call flow involves multiple stages:

- *Content discovery and manifest retrieval:* The 5GMSd Application Provider publishes a presentation manifest at M2d, which is augmented by the MNO to include steering metadata (e.g., base URLs, steering logic).

- *Steering decision and content request:* The 5GMSd Client queries the steering server (via M4d) for an optimal delivery path. The decision incorporates real-time factors, such as network congestion, content cache location, and user QoS profiles.

- *Content delivery:* Based on the steering server's response, the 5GMSd Client retrieves content from the selected 5GMSd AS endpoint/location (reference point M4d) or external CDN.

- *Adaptation and monitoring:* The delivery adapts dynamically to changing conditions, ensuring uninterrupted playback and meeting the KPIs for latency and throughput.

The detailed description if for further study.

### 5.17.5 Gap analysis and requirements

A solution for manifest manipulation and metadata exchange between MNOs and external CDNs may be required, including security aspects to ensure that steering decisions from the external domain are safe.

The complete gap analysis is for further study.

### 5.17.6 Candidate solutions

Candidate solutions may include Dynamic Content Steering using the DASH Content Steering Manifest (DCSM) as defined in ETSI TS 103 998 [ETSI-CS].

A comprehensive analysis of candidate solutions and their applicability is for further study.

### 5.17.7 Summary and conclusions

The collaboration scenarios documented in clause 5.17.2 are intended to address the challenges of integrating server- and network-assisted streaming in hybrid environments, leveraging content steering to optimize delivery paths across trusted and external networks.

Further study is needed to complete the analysis.