**3GPP TSG- Meeting #**

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| *CR-Form-v12.3* |
| **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:*** |  |
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| ***Work item code:*** |  |  | ***Date:*** |  |
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| ***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 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)* |
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| ***Reason for change:*** | 1. **Common Client Metadata**: While 3GPP and MPEG in DASH support DASH metrics, the reporting is not common to any player, for example all DASH players as well as HLS players. As an example, CTA WAVE has developed: CTA-5004: Web Application Video Ecosystem Common-Media-Client-Data (CMCD) with an excellent overview here: https://ottverse.com/common-media-client-data-cmcd/. It is worthwhile to study the benefits of integrating commonly supported metrics and client data reporting in 5GMS workflows. The focus is the integration of already defined metrics rather than developing new metrics. Examples of study include support of specific metric keys, player APIs, sending options from client to server (user plane, M5 reference point, EVEX), M3 reference point impact, as well as usage of the data in operations. A study of creating a common harmonized reporting framework and studying the interaction of different frameworks may be included. For details see S4-242156, 26804-0015rev9
2. **Common Server-and Network-Assisted Streaming**: MPEG-DASH supports Server and Network Assisted DASH (SAND). Certain profiles of SAND were adopted in TS 26.247, but the industry has generalized the concepts in SAND in efforts such as Content Steering (see ETSI TS 103 998), Web Application Video Ecosystem (WAVE) specification for Common Media Server Data (CMSD), or Addressable Resource Index (ARI) Tracks in MPEG. The study and integration of these technologies into the Media Delivery System and MBS/MBMS workflows is of significant interest, in particular also in combination with existing QoS mechanisms. For details see S4-242168, 26804-0009rev6
3. **Multi-CDN and Multi-Access Media Delivery**: Content distributors often use multiple Content Delivery Networks (CDNs) to distribute their content to tend-users. As an example, they may upload a copy of their catalogue to each CDN, or more commonly have all CDNs pull the content from a common origin. In advanced deployments, technologies such as Coded Multisource Media Format (CMMF) use Application Layer FEC techniques to stripe different subsets of content across multiple CDNs. Different client implementations may then beneficially use the content on multiple CDNs, potentially guided by the service or network provider. In addition, formats and techniques for generating content for multiple CDN delivery such as MPEG-DASH Part 9 (ReAP) may be taken into account. Further extensions include the ability for a client to use multiple access networks at the same time to support media delivery. Study of integration of different technologies into the Media Delivery System is of relevance to address content provisioning, content hosting, impacts on user plane reference points M2 and M4, and on media session handling at reference point M5 as well as potential benefits in terms of quality and resource usage. For details see S4-242235, 26804-0006rev24 and S4-242242, 26804-0013rev10
4. **Modem Usage Optimized Media Streaming**: In Rel-18, basic support for Background Data Transfer is added. UE power resources are constrained, and media delivery typically also results in power consumption if the radio is always connected. In order to better support streaming services, requests and access to the modem and the resources should be well balanced. Enhancements to Background Data Transfer to support preload as well as functionality of what is defined in W3C Managed Media Source Extension to minimize active network connections are relevant topics to study with the aim of limiting battery consumption in the UE resulting from media delivery. For details see S4-242167, 26804-0010rev6
5. **DRM and Conditional Access**: DRM and Conditional Access are commonly used by third-party streaming services. However, in case streaming is done through MBS or MBMS, a more careful management of the keys needs to be checked. Scalability of key delivery is an issue. The support for -encrypted content in Unicast/Multicast and Broadcast is relevant. Integration of Content Protection interfaces in the provisioning, for example using CPIX back-end interfaces is of high relevance for the industry and should accordingly be studied. The impacts of these on media plane (reference points M2 and M4) as well as the media session handling APIs (reference points M3, M5) should also be studied. For details see S4-242228, 26804-0016rev9
6. **DASH/HLS Interoperability**: DASH/HLS interoperability is a key issue to support highly scalable distribution systems for CDN-based distribution as well as for MBS/MBMS distribution. Offering common CMAF segments that can be consumed by both DASH and HLS media players promises to address these issues. However, detailed nuances need to be identified to ensure optimized delivery and CTA WAVE has provided detailed guidelines in CTA-5005-A to support this matter. Studying these guidelines and understanding the impacts on the 5GMS System as well as MBS/MBMS distribution is of relevance. In addition, formats and techniques supporting DASH/HLS interoperability such as MPEG-DASH part 9 (ReAP) may be taken into account. For details see S4-242166, 26804-0011rev7
7. **Improved QoS support**: In Rel-18, SA2 has defined a number of new features in the 5G System, especially in the PCF, from which media delivery may benefit. Examples documented in TS 23.501 include the use of Explicit Congestion Notification (ECN) to support Low Latency, Low Loss, Scalable Throughput (L4S) services (clause 5.37.3), PDU Set handling (clause 5.37.5) and QoS Monitoring (clause 5.45), and there are likely others. The impact and usefulness of selected features is preferably studied. The functions identified in this context may be studied in one or more of the above work topicsS4-242241, 26804-0007rev11
8. **Impacts and opportunities of QUIC for segmented content delivery**: Since the finalisation of the QUIC protocol by the IETF in May 2021, there has been significant deployments of QUIC driven by the usage of HTTP/3 for streaming services. In the IETF, the working group on Media Over QUIC (MOQ) is working towards an extensible protocol for publishing media for ingest and distribution. While QUIC is mostly used today as the underlying protocol of HTTP/3, there is still open questions as to how media segments are delivered over QUIC streams when using HTTP/3 but also considering other QUIC-based protocols such as MOQ. Considering different types of media application, e.g. multi-stream use cases, will be of interest. Studying the various strategies for delivering segmented content over QUIC streams will also bring insights for the network management aspects. For instance, findings in this domain may be relevant to WT#2.1 in the ongoing study in SA2 called FS\_XRM\_Ph2 (SP-231671) whose deliverable is available as TR 23.700-70. For details see S4-242171, 26804-0012rev3 and S4-242163, 26804-0019rev8
9. **Dynamic Content Generation from multiple sources**: Introduce the key issue of dynamic content generation in redundant workflows that is common in the media industry. There are some benefits in deploying this closer to the user in the mobile network. For details see S4-242214, 26804-0017rev5
10. An LS from 5G-MAG was received on potential future study topics related to usage of uplink streaming for media production and contribution in S4-242056.
11. Conclusions are needed to identify normative work. For details see S4-242131, 26804-0022rev1
12. Editorial Updates and corrections
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| ***Summary of change:*** | Addresses the work item objectives for this key issue* Documents the key issue in more detail, in particular how they relate to the 3GPP Media Delivery architecture and/or the MBS User Service architecture
* Studies collaboration scenarios between the Application Service Provider and the 5G System and for each of the key topics.
* Based on existing architectures, provides one or more deployment architectures that address the key topics and the collaboration models.
* Maps the key topics to basic functions and develop high-level call flows.
* Identifies the issues that need to be solved.
* Provides candidate solutions including call flows, protocols and APIs for each of the identified issues.

Identifies gaps and recommend potential normative work for stage-2 and stage-3, including which existing specifications would be impacted and/or if any new specifications would preferably be developed. |
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| ***Consequences if not approved:*** |  |
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| ***Clauses affected:*** | 2, 3.3, 5.2.4.1, 5.2.5, 5.2.6.2, 5.2.7.2, 5.4, 5.4.1.1, 5.4.2.3, 5.4.3.4, 5.4.5.2, 5.4.5.4, 5.4.5.5, 5.4.6.1, 5.5.2, 5.5.2.7, 5.5.3, 5.5.4.4, 5.5.5.2.4, 5.5.6a (new), 5.5.7, 5.7.3, 5.7.4, 5.7.5, 5.7.6, 5.9.4, 5.9.5, 5.9.6.3, 5.10, 5.10.1, 5.10.2, 5.10.3, 5.10.4, 5.10.5, 5.10.6, 5.12.1.2, 5.12.2, 5.12.3, 5.12.4, 5.15 (new), 5.16 (new), 5.17 (new), 5.18 (new), 5.19 (new), 5.20 (new), 5.21 (new), 5.22 (new) 5.23 (new), 5.24 (new), 5.25 (new), 5.26 (new), 6.1, 6.4, 6.5, 6.8, 6.10, 6.15 (new), 6.16 (new), 6.17 (new), 6.18 (new), 6.19 (new), 6.20 (new), 6.21 (new), 6.22 (new) 6.23 (new), 6.24 (new), 6.25 (new), 6.26 (new), 7, 7.1, 7.2, 7.3 (new), A.1, A.1.0, A.1.1, A.1.2, Annex B (new) |
|  |  |
|  | **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 ...  |
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| ***Other comments:*** | This CR merges the agreed CRs* S4-242156, 26804-0015rev9
* S4-242168, 26804-0009rev6
* S4-242235, 26804-0006rev24
* S4-242242, 26804-0013rev10
* S4-242167, 26804-0010rev6
* S4-242228, 26804-0016rev9
* S4-242166, 26804-0011rev7
* S4-242241, 26804-0007rev11
* S4-242171, 26804-0012rev3
* S4-242163, 26804-0019rev8
* S4-242214, 26804-0017rev5
* S4-242131, 26804-0022rev1
* [S4-241884, 26804-0017rev3]
* [S4-242153 (pp) 26501-0098rev3]
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| ***This CR's revision history:*** |  |

## ===== CHANGE =====