**3GPP TSG SA WG4 #112e *S4-210307***

**E-meeting, 1st – 10th February 2021**

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| *CR-Form-v12.0* | | | | | | | | |
| **Pseudo CHANGE REQUEST** | | | | | | | | |
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|  | **26.804** | **CR** | **<CR#>** | **rev** | **-** | **Current version:** | **0.0.0** |  |
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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:*** | [FS\_5GMS-EXT] Key Topic Traffic Identification | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Qualcomm Incorporated, Ericsson LM | | | | | | | | | |
| ***Source to TSG:*** | SA4 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | FS\_5GMS-EXT | | | | |  | ***Date:*** | | | 2021-01-25 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **B** |  | | | | | ***Release:*** | | | Rel-17 |
|  | *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-12 (Release 12)* *Rel-13 (Release 13) Rel-14 (Release 14) Rel-15 (Release 15) Rel-16 (Release 16)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | The study item description identifes the key topic “Traffic Identification”. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | Adds the structure and description for this key topic | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | Key topic not addressed | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **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:*** | |  | | | | | | | | |
| ***56*** | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

**===== 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*.

[1] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".

[2] 3GPP TS 26.501: " 5G Media Streaming (5GMS); General description and architecture".

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

[4] 3GPP TS 26.512: "5G Media Streaming (5GMS); Protocols".

[5] 3GPP TS 23.501: "System architecture for the 5G System (5GS)".

[6] 3GPP TS 29.551: “5G System; Packet Flow Description Management Service; Stage 3"

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

# 4 Introduction to 5G Media Streaming

## 4.1 Introduction

## 4.2 Collaboration Scenarios

## 4.3 Architectures

## 4.4 Summary of Stage-3 enablers

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# 5 Key Topics

## 5.1 Introduction

## 5.3 Traffic Identification

### 5.3.1 Description

For different features within the 5G Media Streaming Architecture, it is necessary for the 5G System to identify the traffic flows. Multimedia streaming applications might not be able to uniquely identify the 5-Tuple of the streaming session, since the 5-Tuples are often changing. This is due to factors such as load balancing, CDN distribution, multiple concurrent requests for different types of resources, etc. This study will address how to properly configure the 5G System to enable efficient detection of application flows (service data flows) e.g. for event reporting, and QoS profile usage, etc.

The Management of Packet Flow Descriptions enables the UPF to perform accurate application detection when PFD(s) are provided by an ASP and then to apply enforcement actions as instructed in the PCC Rule.

The operator is able to configure pre-defined PCC Rules in the SMF or dynamic PCC Rules in the PCF that include at least an application identifier for service data flow detection, charging control information, i.e. charging key and optionally the Sponsor identifier or the A SP identifier or both. Depending on the service level agreements between the operator and the Application Server Provider, it may be possible for the ASP to provide individual PFDs or the full set of PFDs for each application identifier maintained by the ASP to the SMF via the PFD Management service in the NEF (PFDF). The PFDs become part of the application detection filters in the SMF/UPF and therefore are used as part of the logic to detect traffic generated by an application. The ASP may remove or modify some or all of the PFDs which have been provided previously for one or more application identifiers. The SMF may report the application stop to the PCF for a application instance identifier as defined in clause 5.8.2.8.4 of TS 23.501 [5] if the removed/modified PFD in SMF/UPF results in that the stop of the application instance is not being able to be detected.

The ASP manages (provision, update, delete) the PFDs through the NEF (PFDF). The PFD(s) are transferred to the SMF through the NEF (PFDF). The PFDF is a logical functionality in the NEF which receives PFD(s) from the ASP through the NEF, stores the PFD(s) in the UDR and provides the PFD(s) to the SMF(s) either on the request from ASP PFD management through NEF (PFDF) (push mode) or on the request from SMF (pull mode). The PFDF functionality is a service provided by the NEF.

The ASP may provide/update/remove PFDs with an allowed delay to the NEF (PFDF). Upon reception of the request from the ASP, the NEF (PFDF) shall check if the ASP is authorized to provide/update/remove those PFD(s) and request the allowed delay. The NEF (PFDF) may be configured with a minimum allowed delay based on SLA to authorize the allowed delay provided by the ASP. When ASP and requested allowed delay are successfully authorized, the NEF (PFDF) shall translate each external Application Identifier to the corresponding Application Identifier known in the core network. The NEF (PFDF) stores the PDF(s) into the UDR.

The Application identifier is an index to a set of application detection rules configured in UPF. It is an identifier that can be mapped to a specific application traffic detection rule

The procedure is depicted by the following diagram:



The PFD (Packet Flow Description) is a set of information enabling the detection of application traffic.

Each PFD may be identified by a PFD id. A PFD id is unique in the scope of a particular application identifier. Conditions for when PFD ID is included in the PFD is described in TS 29.551 [6]. There may be different PFD types associated to an application identifier.

A PFD include the following information:

- PFD id; and

- one or more of the following:

- 3-tuple(s) including protocol, server side IP address and port number;

- the significant parts of the URL to be matched, e.g. host name;

- a Domain name matching criteria and information about applicable protocol(s).

### 5.3.2 Collaboration Scenarios

The AP concludes with the MNO an SLA to provide differentiated treatment, including QoS and charging for their application. The AP provides the necessary information to the MNO to identify the traffic, to ensure correct and exclusive identification of the related traffic. The MNO identifies the traffic correctly and applies the agreed traffic treatment.

Due to privacy concerns, the content hosting is provided by the Application Provider in an external data network. However, the 5GMSd Application Provider leverages the network features either via a 5GMSd AF in the trusted data network or via a 5GMSd AF in the external data network.



Figure 5.9.2-1: Collaboration 1 (Collaboration 3 of TS 26.501)



Figure 5.9.2-2: Collaboration 2 (Collaboration 4 of TS 26.501)

In order to use flow-based network features (such as different QoS classes or different charging policies), the 5G System needs to detect the relevant traffic. The 5G System uses so-called **Packet Detection Rules** (PDRs) in the UPF to detect the traffic. The PDRs are created based on **Service Data Flow Templates**. The Service Data Flow Templates are provided by the 5GMSd AF.

### 5.3.3 Deployment Architectures

The following figure depicts a potential architecture design for the realization of traffic identification. The architecture shows the involved network functions in the traffic identification.



### 5.3.4 Mapping to 5G Media Streaming and High-Level Call Flows

The following are potential and simplified call flows for the realization of the traffic identification. In the first call flow, the provisioning step is described.



In the second call flow, the update procedure for the PFD to adjust to an actual session is described.



### 5.3.5 Potential open issues

The exact behavior and information that needs to be provided to and by the 5GMSd AF as well as the MSH need to be specified.

### 5.3.6 Candidate Solutions

Editor’s Note: Provide candidate solutions (including call flows) for each of the identified issues.

# Annex X – Media Streaming Protocols

### X.1 Status and usage of Web Protocols

The site HTTPArchive.org [x1] offers some insights into the uptake of different HTTP protocol versions by publicly accessible websites. The Report “State of the Web” contains statistics about the number of TCP connections per page and the number of HTTP/2 requests over a time period. The site crawls millions of URLs every month. The URLs are taken from the Chrome User Experience Report.

Currently, around 70% of websites support HTTP/2. Unfortunately, the site does not show statistics for video usage.

The site quic.netray.io [x2] offers some insights into the HTTP/3 ( QUIC) take-up.

### X.1.1 M4d protocol usage

It is anticipated that MPEG‑DASH would be used by many Application Providers on the M4d Interface if 5GMS services become widely deployed. MPEG‑DASH defines the manifest format and also the media segment format. MPEG‑DASH allows several different ways to use the underlying HTTP transport, depending on the DASH Profile.

For traffic identification, the identification of the transport protocol (TCP or UDP) used on interface M4d is essential, since the transport protocol needs to be described in the Service Data Flow Template. HTTP/1.1 and HTTP/2 both use TCP transport. HTTP/3 uses a UDP-based QUIC transport. Furthermore, HTTP/1.1. often leverages multiple TCP connections simultaneously, while HTTP/2 and HTTP/3 allow more efficient reuse of the transport through the technique of non-blocking request multiplexing on a single transport connection.

### X.1.2 Results of HTTP protocol version usage study

Editor’s Note: It is currently unclear how to document the results of the transport connection usage study. It is clear, this this represents only a small snapshot on how the different HTTP versions are used and currently only focused on browser based clients.

Within a small study, the transport protocol usage of three major video-on-demand providers were studied, namely YouTube, Netflix and Amazon. The study leveraged browser-based DASH players, using the popular web browsers Google Chrome (version 87.0.4280.141, 64-bit running on Win 10 Pro Version 2004 b 19041.746) and Mozilla Firefox (version 84.0.2, 64-bit running on Win 10 Pro Version 2004 b 19041.746). The intention was to get more insights into HTTP usage.

a) Accessing YouTube with Chrome, we found that YouTube in a Chrome Browser uses MPEG‑DASH with HTTP/3 transport. Several YouTube clips were selected, and HTTP/3 was consistently used for retrieving both media segments and other content. Detailed investigations showed that only a single HTTP/3 connection was established to the server.

b) Accessing Amazon Prime with Chrome, we found that Amazon Prime uses MPEG‑DASH. For some movies, HTTP/2 is used for all content (including media segments). Some other movies used HTTP/1.1 for media segments and HTTP/2 for non-media segments. It is not clear on which basis the application protocol is selected.

c) Accessing Netflix with Firefox, we found that Netflix uses MPEG‑DASH with HTTP/1.1. Some objects, such as images, are fetched using HTTP/2.

d) Accessing YouTube with Firefox, we found that YouTube uses MPEG‑DASH with HTTP/1.1. Non-video transactions use HTTP/2.