3GPP TSG-WG SA2 Meeting #169 S2-2505196r01

Fukuoka, Japan, 19-23 May, 2025 (revision of S2-2504372)

**Source: Nokia**

**Title: Study on Extended Reality and Media Service (XRM) Phase 3**

**Document for: Approval**

**Agenda Item: 30.2**

3GPP™ Work Item Description

Information on Work Items can be found at <http://www.3gpp.org/Work-Items>
See also the [3GPP Working Procedures](http://www.3gpp.org/specifications-groups/working-procedures), article 39 and the TSG Working Methods in [3GPP TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm)

Title: Study on Extended Reality and Media Service (XRM) Phase 3

Acronym: FS\_XRM\_Ph3

Unique identifier: TBD

Potential target Release: Rel-20

# 1 Impacts

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Affects: | UICC apps | ME | AN | CN | Others (specify) |
| Yes | X |  |  | X |  |
| No |  | X | X |  |  |
| Don't know |  |  |  |  |  |

# 2 Classification of the Work Item and linked work items

## 2.1 Primary classification

### This work item is a …

|  |  |
| --- | --- |
| X | Study  |
|  | Normative – Stage 1 |
|  | Normative – Stage 2 |
|  | Normative – Stage 3 |
|  | Normative – Other\* |

**\* Other = e.g. testing**

## 2.2 Parent Work Item

For a brand-new topic, use “N/A” in the table below. Otherwise indicate the parent Work Item.

|  |
| --- |
| Parent Work / Study Items  |
| Acronym | Working Group | Unique ID | Title (as in 3GPP Work Plan) |
|  |  |  |  |

### 2.3 Other related Work Items and dependencies

|  |
| --- |
| Other related Work /Study Items (if any) |
| Unique ID | Title | Nature of relationship |
| 1010032 | Study on Extended Reality and Media Service (XRM) Phase 2 | Continuation of the Rel. 19 WID |

# 3 Justification

For the support of XR services, a real time coordination between application layer and the network is inevitable. A bi-directional communication channel between the Application Client (AC) at the UE and the AS, via UPF, would enable direct information exchange between the CN and the Application in a controlled manner, i.e., subject to operator policies/SLA etc., without relying on the extensive usage of the N5/N33 based exposure functionality. Thus, the core network could then expose e.g., Rate Limitation information, Available Data Rate information, Congestion information to the AC. Similarly, the AC could provide the UPF direct updates about traffic characteristics such as maximum burst size and periodicity for either UL, DL or both directions. Furthermore, the communication channel could be leveraged to discover, authorise and activate on-path services offered by the ASP based on operator policies.

Ultimately the objective of XRM features such as PDU Set handling, ECN marking for L4S, EoDB indication, support of dynamically changing traffic characteristics like Burst Size and Time to Next Burst marking, etc. is to improve subscriber QoE or increase capacity utilization. However, Rel-18 and Rel-19 analytics from the NWDAF do not support assessing the circumstances when XRM features actually achieve these goals, and how parameters or XRM features may be adjusted to produce better results. It is proposed to study how to use existing analytics to evaluate the impact of XRM features on subscriber experience and network performance.

So far, Rel-18 and Rel-19 have not studied in-network media delivery on user plane in 5GC/UPF to support media data distribution, in order to reduce dependency on unstable latency conditions on N6 as well as N6 transmission bandwidth. For example, user experience of live streaming services is highly affected by end-to-end latency, jitter and video resolution, which means low latency and low jitter can reduce the first screen delay and video frame freezing and high video resolution provides better picture quality. However, the existence of unstable N6 delay and jitter has a negative impact on the end-to-end delay and jitter. In addition, the video resolution selection may be restricted by the server side due to outbound bandwidth cost at N6, for example, the high resolution may be limited during busy hours (with a large number of access users), which restricts the use of the high-resolution video. In Rel-19 XRM, the MoQ relay functionality was introduced as part of UPF, when multiple users subscribe to the MoQ relay for the same live streaming service, the MoQ relay can distribute the media content received from publisher to different users, which is helpful to reduce the first screen delay, jitter and bandwidth costs at N6, similarly, for the HTTP(s) based live streaming service, the distribution at UPF to different users also brings the above mentioned benefits.

Similarly, it is not studied how to support flexible mapping between MoQ metadata and XRM related information such as PDU Set related information.

# 4 Objective

The study item aims at investigating further enhancements to support extended reality and media services with the following work tasks:

- WT-1: Enhancements for information exposure to the application and improved traffic management

- Study whether and how to enable coordination between CN and Application in-band including information exposure (to the Application Client of e.g. rate limitation, available bit rate and from the Application Client of e.g. traffic characteristics), discovery, authorization and activation of on-path services offered to the ASP according to operator policies

NOTE 1: Regarding information exchange the goal is to build the proper framework to expose existing information but in-band for effectiveness. The same framework could be leveraged in future releases for more use cases.

NOTE 2: With the exception of the Application Client in the UE, this WT will not impact the UE.

NOTE 3: Whether and how the UPF trusts the information provided by the UE and whether there are security problems (e.g. DDOS to the UPF) needs to be confirmed from SA3.

- WT-2: Study how to use existing analytics to assess the impact/improvement (if any) of Rel. 18 and Rel. 19 XRM features (e.g. PDU Set handling, ECN marking for L4S, EoDB marking, use of burst size, etc.) on subscriber experience and network performance by providing input on which XRM features are activated.

NOTE 4: This WT shall not impact the NG-RAN nor the UE.

- WT-3: Study improvements for media delivery by the user plane in 5GC/UPF when multiple users access the same media service e.g. live streaming service in order to reduce transmission latency and bandwidth, for the use of MoQ and other protocols e.g. http(s).

NOTE 5: This WT shall not impact the UE.

- WT-4: Study how to support flexible mapping between MoQ metadata and XRM related information such as PDU Set related information.

NOTE 6: This WT shall not impact the UE.

## TU estimates and dependencies

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Work Task ID** | **TU Estimate****(Study)** | **TU Estimate****(Normative)** | **RAN Dependency****(Yes/No/Maybe)**  | **Inter Work Tasks Dependency** Editor’s Note: This column should highlight if WT#x is self-contained, or is depended on completion of other WTs |
| WT-1 | 1 | 1 | No | WT-1 is self-contained |
| WT-2 | 0.5 | 0.5 | No | WT-2 is self-contained |
| WT-3 | 0.5 | 0.5 | No | WT-3 is self-contained |
| WT-4 | 0.5 | 0.5 | No | WT-4 is self-contained |

**Total TU estimates for the study phase: 2.5**

**Total TU estimates for the normative phase: 2.5**

**Total TU estimates: 7**

# 5 Expected Output and Time scale

|  |
| --- |
| New specifications |
| Type  | TS/TR number | Title | For info at TSG#  | For approval at TSG# | Rapporteur |
| TR | 23.abc-de | Study on Extended Reality and Media Service (XRM) Phase 3 |  | TSG#111 |  |
|  |  |  |  |  |  |

|  |
| --- |
| Impacted existing TS/TR |
| TS/TR No. | Description of change  | Target completion plenary# | Remarks |
|  |  |  |  |

# 6 Work item Rapporteur(s)

TBD

# 7 Work item leadership

SA2

# 8 Aspects that involve other WGs

Security aspects shall be covered by/and/or in collaboration with SA3.

For Media content delivery aspects collaboration with SA4 may be needed.

# 9 Supporting Individual Members

|  |
| --- |
| Supporting IM name |
| Nokia |
| Xiaomi? |
| Charter |
| China Unicom? |
| China Telecom? |
| SK Telecom? |
| DOCOMO? |
| Huawei |
| Ericsson? |
| ZTE? |
| CMCC? |
| Lenovo? |
| InterDigital? |
| Tencent?  |
| ? |