3GPP TR 26.851 V11.1.0 (2013-03)

Technical Report

3rd Generation Partnership Project; Technical Specification Group Services and System Aspects; Enhancements to Multimedia (EMM); Download Delivery Enhancements (DDE) and IMS-based PSS and MBMS streaming synchronization Enhancements (IPME) aspects (Release 11)

Keywords
3GPP, Multimedia

3GPP

Postal address

3GPP support office address
650 Route des Lucioles - Sophia Antipolis
Valbonne - FRANCE
Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Internet
http://www.3gpp.org

Contents

Foreword

This Technical Report has been produced by the 3rd Generation Partnership Project (3GPP).

The contents of the present document are subject to continuing work within the TSG and may change following formal TSG approval. Should the TSG modify the contents of the present document, it will be re-released by the TSG with an identifying change of release date and an increase in version number as follows:

Version x.y.z

where:

- x the first digit:
  - 1 presented to TSG for information;
  - 2 presented to TSG for approval;
  - 3 or greater indicates TSG approved document under change control.
- y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.
- z the third digit is incremented when editorial only changes have been incorporated in the document.

1 Scope

The present document contains the results of the work items EMM , EMM-DDE and EMM-IPME. This document does not include the results from the EMM-EFEC work item.

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 26.346: "Multimedia Broadcast/Multicast Service (MBMS); Protocols and codecs".

[3] 3GPP TS 26.237: "IP Multimedia Subsystem (IMS) based Packet Switch Streaming (PSS) and Multimedia Broadcast/Multicast Service (MBMS) User Service; Protocols".

[4] 3GPP TS 26.247: "Transparent end-to-end Packet-switched Streaming Service (PSS); Progressive Download and Dynamic Adaptive Streaming over HTTP (3GP-DASH)".

[5] 3GPP TR 26.946: "Multimedia Broadcast/Multicast Service (MBMS) user service guidelines".

[6] IETF RFC 6184: "RTP Payload Format for H.264 Video".

[7] IETF RFC 3986: "Uniform Resource Identifier (URI): Generic Syntax".

[8] OMA-TS-MLP-V3_3-20100831-C: "Mobile Location Protocol 3.3".

3 Abbreviations

For the purposes of the present document, the abbreviations given in TR 21.905 [1] and the following apply:

NOTE: An abbreviation defined in the present document takes precedence over the definition of the same abbreviation, if any, in TR 21.905 [1].

AVC	Advanced Video Coding
DASH	Dynamic Adaptive Streaming over HTTP
DDE	Download Delivery Enhancements
EFEC	Enhancement to FEC
eMBMS	E-UTRAN MBMS
EMM	Enhancements to Multimedia
FDT	File Description Table
FEC	Forward Error Correction
FLUTE	File deLivery over Unidirectional Transport
GNSS	Global Navigation Satellite System
GPS	Global Positioning System
HDTV	High Definition TV
HTTP	Hypertext Transfer Protocol
IDR	Independent Data Refresh

IPME	IMS-based PSS and MBMS Streaming Synchronization Enhancements
IUT	Inter UE Session Transfer
LA	LosAngeles
MB	MegaByte
MBMS	Multimedia Broadcast/Multicast Service
MIME	Multipurpose Internet Mail Extensions
MLP	Mobile Location Protocol
MMS	Multimedia Messaging Service
MTSI	Multimedia Telephony Service for IMS
OMA	Open Mobile Alliance
OTA	Over The Air
PSS	Packet-switched Streaming Service
QoE	Quality of Experience
RFC	Request For Comment
SAP	Stream Access Points
TV	Television
UE	User Equipment
URI	Uniform Resource Identifier
URL	Uniform Resource Locator
XML	Extensible Markup Language

4 Enhancements to Multimedia: PSS, MMS, and MBMS Enhancements and Performance Improvements (EMM)

4.1 Introduction

This clause describes the EMM use cases, associated recommended requirements, assumptions, other enhancements and provides a list of impacted technical specifications.

This document is written in a form that the recommendations made and assumptions stated are directed to authors and contributors to Technical Specifications being affected as a result of the study presented here.

4.2 Use Cases, Requirements and Working assumptions

4.2.1 Use Case#1: Reception reporting aggregation for quick channel change

One could consider the use case of a user who is channel surfing on a set of mobile TV services. The user clicks through several channels rapidly for a brief period before settling on a single channel for a more extended period of time.

The UE is requested to send reception reports for the services he has and is continuing to consume. By aggregating the reception reports, the UE optimizes the transfer of the report.

4.2.1.1 Recommended Requirements

- If the next session start is less than OffsetTime after a session end, then it is recommended that a UE shall disable the backoff timer for uploading the previously collected log and shall collect the new log per the previous samplePercentage (if samplePercentage was used).
- It is recommended that the UE shall set the upload timer again after the end of the session.

- It is recommended that the UE should maintain the decision of whether to log or not for consistency. In case samplePercentage is specified, then calculate whether or not to perform statistical reporting again if the session start is less than OffsetTime after the end of the last viewing session.
- It is recommended that the existing mechanism of using multipart MIME to bundle multiple single XML files shall be maintained.
- It is recommended to make it possible that the aggregation could be made at the XML level by using a number of statisticalReport elements that may be present in a single reception report.
- In the case of multiple aggregated RAck reporting, the implications of backward compatibility between R11 client and R10 and earlier Reception Reporting Server need to be examined and considered.

4.2.1.2 Assumptions

None identified.

4.3 Other Enhancements

4.3.1 MBMS video enhancements

The EMM Work Item Description has the following objective:

- "Given the Rel-10 and Rel-11 changes on video encoding and decoding capabilities in MTSI and PSS, it is felt that MMS encoding capabilities would require an upgrade. For example MMS encoding capabilities could be aligned to MTSI mandatory H.264 Constrained Baseline Profile level 1.2 as opposed to current H.263 support. The same would apply to PSS and MBMS services which may require upgrade of mandatory and recommended codec support given the wider availability of UEs with higher video rendering capabilities (e.g. tablets). These upgrades would both improve user experience and simplify implementations".

The objective is to update video codec support of PSS, MMS and MBMS services in a consistent manner to improve video quality and simplify content preparation/adaptation, e.g. align MMS support to MTSI video codec support and improve PSS/MBMS video codec mandatory support with e.g. H.264.

In order to fulfil this objective, the following changes were made in the specification:

- H.264 (AVC) Constrained Baseline Profile Level 1.3 is changed from recommended to mandatory for MBMS clients.
- H.264 (AVC) High Profile Level 3.1 is mandatory for MBMS clients supporting HDTV video content at a resolution of 1280x720 (720p) with progressive scan at 30 frames per second.
- - Reference RFC 6184 [6] superseded RFC 3984 and it is now updated.

4.4 Impacted Technical Specification(s)

The changes required have been included in TS 26.346 [2].

5 Download Delivery Enhancements for MBMS (EMM-DDE)

5.1 Introduction

This clause describes the EMM-DDE use cases, associated recommended requirements, assumptions, and provides a list of impacted technical specifications.

5.2 Use Cases, Recommended Requirements and Assumptions

5.2.1 Use Case#1: Continuity between MBMS Download and HTTP-based Delivery of DASH-Formatted Content

A user would like to watch DASH-formatted content. The UE device of the user is capable of downloading DASH-formatted content over both HTTP-based delivery and MBMS download delivery methods. Initially, the user is outside of the MBMS coverage area and consequently receives the DASH-formatted content over HTTP-based delivery. Later on, the user enters into the MBMS coverage area, and the UE triggers a switch to the MBMS download delivery method for receiving DASH-formatted content. After a while, the user initiates a trick play mode action, and consequently the UE triggers a switch back to the HTTP-based delivery method for receiving DASH-formatted content.

To summarize, here are the use cases for which such switching between MBMS download delivery and HTTP-based delivery methods are relevant:

a) Switching from MBMS download to unicast/HTTP-based delivery method:

- Without channel change e.g. when a user is viewing an MBMS user service and moves out of MBMS coverage, or the user initiates trick play mode action, etc.
- With channel change e.g. changing to a channel only available on unicast/HTTP.

b) Switching from unicast/HTTP-based delivery to MBMS download:

- Without channel change e.g. the user returns back from trick play mode to a normal MBMS user service, etc.
- With channel change e.g. changing to a channel available on MBMS.

Given such availability of unicast/HTTP and broadcast/FLUTE delivery options for DASH formatted content, it is important to ensure continuity and consistent user experience for the entire streaming session.

5.2.1.1 Recommended Requirements

- - It is recommended to make it possible to switch from MBMS download delivery method to HTTP-based delivery method for downloading DASH-formatted content including:
  - User-initiated content switch with access change: The user requests reception of a service other than the one currently received over MBMS, and the new service is only available over unicast/HTTP.
  - Application-initiated switch of access: The MBMS coverage is lost and alternative reception of the same service is possible over unicast/HTTP.
- - It is recommended to make it possible to switch from HTTP-based delivery method to MBMS download delivery method for downloading DASH-formatted content.
  - User-initiated content switch with access change: The user requests reception of a service other than the one currently received over unicast/HTTP, and the new service is available over MBMS.
  - Application-initiated switch of access: The UE recognizes that MBMS reception of that service is alternatively possible (e.g. because MBMS reception was re-gained), such that the UE may terminate the unicast/HTTPsession and initiate reception over MBMS.
- - It is recommended to make it possible for a network operator to indicate a relative level of preference to the UE within one representation e.g. unicast and broadcast access networks.
- - It is recommended to make it possible to support a complete QoE reporting framework for DASH over combined MBMS download and HTTP-based delivery methods.

5.2.1.2 Assumptions

None identified.

5.2.2 Use Case#2: Multiplexed User Services

An operator identifies that certain MBMS services are almost always consumed together, e.g. Liverpool FC match highlights and alternative commentary tracks. The operator decides that it will multiplex these services onto a single MBMS transport bearer in order to lower the number of MBMS radio bearers provisioned across its network, reduce the amount of signalling across its network, and furthermore, decrease UE complexity by maintaining less session state information.

It is of benefit in the case where a particular user is interested in only one or some of the services on the transport session that the MBMS client has knowledge of when to tune into the transport session in order to receive the content. Some users only want to consume the commentary track (e.g. a visually impared user). By adding timing information to the metadata, a UE is capable of not tuning into the transmission session until the content the user has registered for is being transmitted, therefore saving battery power, requiring less cache, etc.

5.2.2.1 Recommended Requirements

- It is recommended that the mobile operator shall be able to carry more than one user service per transport session.
    - It is recommended that the mobile operator shall be able to signal timing information relating to multiplexed user services per transport session.
    - It is recommended that an MBMS UE shall be able to tune in to transport sessions based on the operator-provided timing information or tune in to the entire session.

5.2.2.2 Assumptions

None identified.

5.2.3 Use Case#3: Separated User Services

A service operator is utilising an eMBMS system to deliver the YouTube top-10 watched videos. These videos may vary from less than 30 seconds to upwards of 30 minutes.

In this use case there can be significant benefits in terms of bandwidth and user experience if it were possible for videos with similar lengths (and therefore file size) to be grouped on separate transport sessions. This would allow for FEC, transmit power, file repair, carousel repetition etc to be provisioned per transport session and not simply per service. The ability to control these individually would prevent over-dimensioning of any parameter to fit the lowest common denominator.

5.2.3.1 Recommended Requirements

- - It is recommended that the mobile operator shall be able to carry objects comprising a single MBMS user service over one or more MBMS transport sessions.
- - It is recommended that the mobile operator shall be able to provision the one or more MBMS transport sessions independently.

5.2.3.2 Assumptions

None identified.

5.2.4 Use Case#4: Location-based Traffic Alert Service

A mobile network operator offers a location-based traffic alert service. The mobile network operator provides a traffic alert service via download delivery for the Los Angeles (LA) metropolitan area. Traffic alerts might be delivered on a periodic basis, or in a dynamic fashion as events occur or conditions change in near real time, such as auto accidents, traffic congestion, unexpected road closure, etc. It also wants to be able to deliver advisories on upcoming and planned events such as highway/lane closure for scheduled repair. The operator wishes to enable selective reception of an individual traffic alert by target area, which may be represented by the nominal coverage area of one or more cell IDs. In addition, based on knowledge that most of its subscriber devices are capable of finer positioning precision than cell-ID (e.g. GPS/GNSS is built in), the operator may choose to specify the reception area as a point with an uncertainty radius, or a polygon whose shape is as defined for example by OMA MLP (see OMA-TS-MLP-V3_3-20100831-C [8]).

Subscribing to such location-dependent service whose content files are associated with target reception data enables motorists to obtain traffic alert information tailored to his/her current location within the service area. Traffic alerts could also be predictively selected by the UE, based on knowledge of its present location, speed and heading, or by known past location behavior, for example in relation to repetitive commute patterns to/from work. The received traffic information provides timely, accurate and location-relevant information on traffic-related problems or events according to scheduled or unexpected occurrences, and as such occurrences evolve. This service provides considerable value and convenience to the subscriber by enhancing his/her ability to avoid, or be warned in advance about, traffic incidents.

5.2.4.1 Recommended Requirements

- It is recommended that the mobile operator shall be able to offer content download delivery services whose contents are targeted to specific locations.
- It is recommended that the mobile operator shall be able to dynamically produce and change the associated target location criteria, and its time validity.
- It is recommended that the mobile operator shall be able to define the target reception area by different parameters, including but not limited to cell-ID.
- It is recommended that the mobile operator shall be able to define filtering criteria by different parameters including but not limited to time in the past, present, or future.
- It is recommended that the UE should take in account a minimum level of confidence in meeting the location criteria in deciding whether to download the associated content.
- It is recommended that the UE should perform selective content reception decision in accordance to the location targeting criteria. The standard shall not define how the reception decision is computed in terms of specific algorithms or technical capabilities.
- It is recommended that the mobile operator shall be able to offer location-based content delivery services while ensuring privacy of subscribers' locations in consuming location-based broadcast services.
- It is recommended that to make it possible for the mobile operator to employ network-controlled, UE-controlled, or hybrid (combination of network- and UE-controlled) positioning technologies in support of download delivery services whose contents are intended for reception in specific locations. It is recommended that the choice of positioning technology/technologies should be driven by considerations such as network efficiency and user privacy.

5.2.4.2 Assumptions

None identified.

5.2.5 Use Case#5: MBMS File Repair via Conventional HTTP Servers

A mobile network operator wishes to use conventional HTTP servers as repair servers for the MBMS File Repair feature. Using conventional web servers allows the operator to leverage the existing, scalable, standardized, and widely-deployed web infrastructure. The operator wishes not to use specialized file-repair servers and would prefer to use the same web servers as for delivering other content.

From a service perspective the operator wishes to re-use content already available on the Internet via standard HTTP servers. Furthermore, the operator can leverage the standardized, reliable, and optimized delivery provided by conventional HTTP-based Content Delivery Networks, resulting in a better and proven user experience with less risks, and reducing their own network congestion. The operator can also enable advanced hybrid Internet/MBMS services, e.g. where eMBMS is used as a "traffic offload service" for Internet content.

It is important that the use of the HTTP-byte range requests be optimized to minimize the number of file repair requests from the repair servers. For an operator that already has an existing MBMS deployment not using HTTP byte range requests for file repair, it is necessary to be able to gradually deploy terminals and servers that use the HTTP byte-range request messaging without negatively impacting the deployed terminals and servers.

5.2.5.1 Recommended Requirements

- It is recommended to make it possible for the mobile network operator to use conventional HTTP/1.1 servers as file repair servers for the MBMS File Repair feature.
- It is recommended to make it possible for terminals to make standard HTTP/1.1 byte-range requests for repair data from the file repair servers.
- It is recommended to make it possible to indicate to terminals the capability to use conventional HTTP byte-range requests to request repair data for a file directly from a content server location. When known, the availability time of the file on the content server should also be indicated to the terminal.
- It is recommended to make it possible to indicate to terminals the capability to use conventional HTTP byte-range requests to request repair data for multiple files from a common or dedicated HTTP server location.
- When a terminal has the option to request data from both a common dedicated HTTP server or a content server, It is recommended to make it possible to indicate a prioritization of which type of server the terminal should select.
- It is recommended to make it possible for the mobile network operator to configure the network broadcast data and also terminal requests for repair data to minimize the amount of unicast load and number of HTTP repair requests.
- It is recommended to make it possible for the mobile network operator to perform a gradual deployment of terminals and conventional servers that support using HTTP byte range request without breaking backward compatibility with currently deployed terminals and servers.
- It is recommended to make it possible for the mobile operator using HTTP servers as file repair servers to collect File Repair statistics for an MBMS session using UE Reception Reports It is recommended to make it also possible for an operator to collect File Repair statistics for an MBMS session from an HTTP File Repair server, i.e. without relying on UE Reception Reports. There is no intention to include the interface between the File Repair Server and the Network Operator within the scope of TS 26.346 [2].

5.2.5.2 Assumptions

- For backwards compatibility, re-use the "serviceURI" element in the Associated Delivery Procedures to indicate the availability of symbol-based repair servers for legacy terminals.
- It is recommended that the changes to indicate the availability of byte-range based repair servers shall be made in the File Delivery Table (FDT). It is recommended that these changes shall be made in a manner that is backwards compatible with pre Release 11 terminals and their XML Schema. It is recommended that no changes be made to the Associated Delivery Procedures.
- Introduce two optional elements in the File element of the File Delivery Table (FDT)

- Each of these elements can be used to provide the URL of the file on a content server or on a common dedicated server.
- When either of these elements are present these locations are prioritized by the terminal before making a request from symbol-based file repair servers (listed under "serverURI" in the Associated Delivery Procedures).
- It is recommended that one element shall have priority over the other in the case that both are present.
- The URLs can be absolute URLs or relative references as described in RFC 3986 [7].

- Associated with each of the above elements, introduce an optional element to indicate the availability time, if known.
- In the FDT introduce two optional elements which, when present, provide a base URL against which to resolve a relative reference included in the two new URL elements in the File element.

5.2.5.3 Gap Analysis

The introduction of the new server URI elements in the File element of the FDT and a BaseURI element into the FDT enable the operator to collect File Repair Statistics from a standard HTTP server without using UE Reception Reports. The operator can use these new elements to provide session-specific URIs which the UE uses to make file repair requests. Using standard analytics, the HTTP server can correlate the URI in these requests with the session over which the file was delivered.

5.2.6 Use Case#6: HTTP Delivery of Partial Resources: Application Access to Incomplete Segments in DASH over MBMS/FLUTE

An MBMS User Service which pertains to streaming of H.264 encoded live video in Dynamic Adaptive Streaming HTTP (DASH) format is delivered by File Delivery over Unidirectional Transport (FLUTE) protocol. A particular user is in a region of marginal coverage which is subject to random errors. This particular service is operating with DASH Live profile and a relatively long Segment duration e.g. 12 seconds, in order to achieve maximum bit rate efficiency. The operating bit rate, for example, is 1 Mbps, so the individual Segments are of a 1.5 MB file size. The average delivery time is less than or equal to 12 seconds. The encoder for this service, on average, produces one Independent Data Refresh (IDR) video frame due to a video content scene change every 6 seconds. These IDRs are marked as Stream Access Points (SAP) and are in addition to the SAP required at the start of each Segment for Live profile. A scene change IDR (SAP) in this context is an IDR generated by a change in video content from one frame to the next significant enough to code most efficiently, as an IDR video frame.

In its current form, with regards to the download delivery method, TS 26.346 does not specify a means for the FLUTE client to pass up to the consuming application a partial file. The result is that any file, in this case a Segment, containing missing data is ultimately discarded. In the case of Application Layer FEC being applied, any file that is not successfully recovered is similarly dropped.

For an example of how partial Segment delivery to the application might enhance end user experience, please see Figures 1 & 2 below.

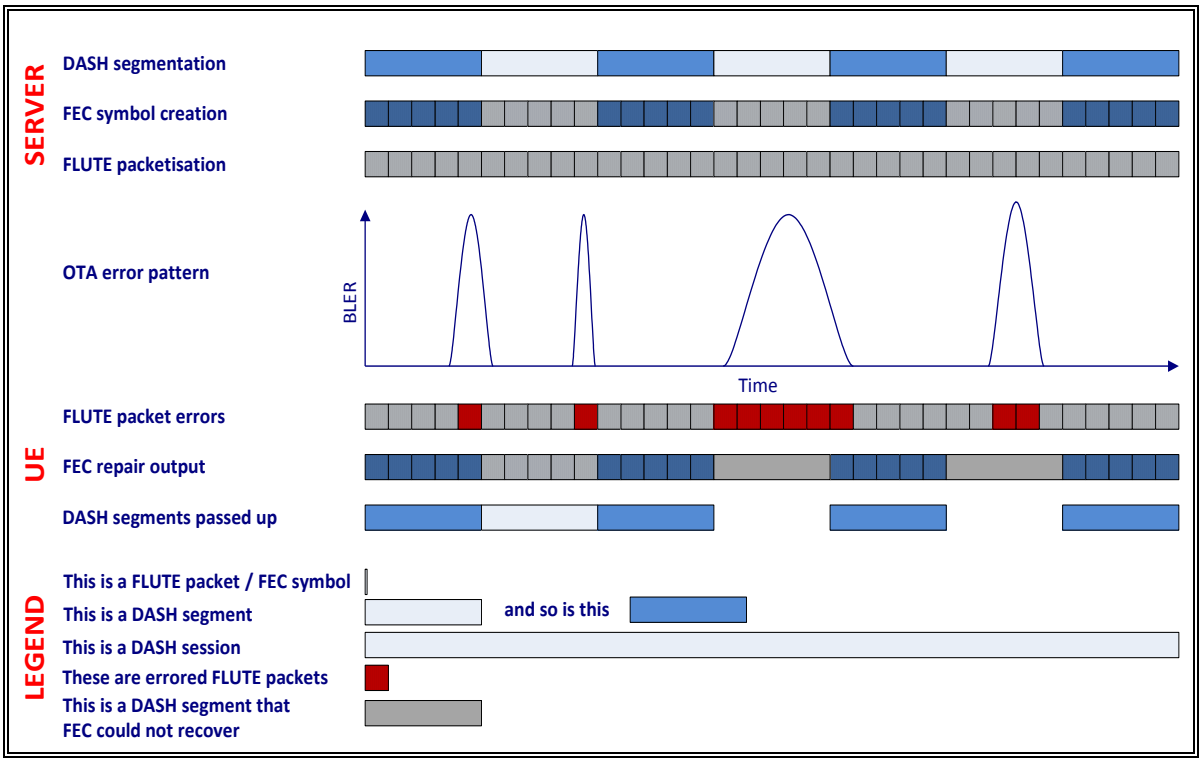

Figure 1: Current FLUTE operation

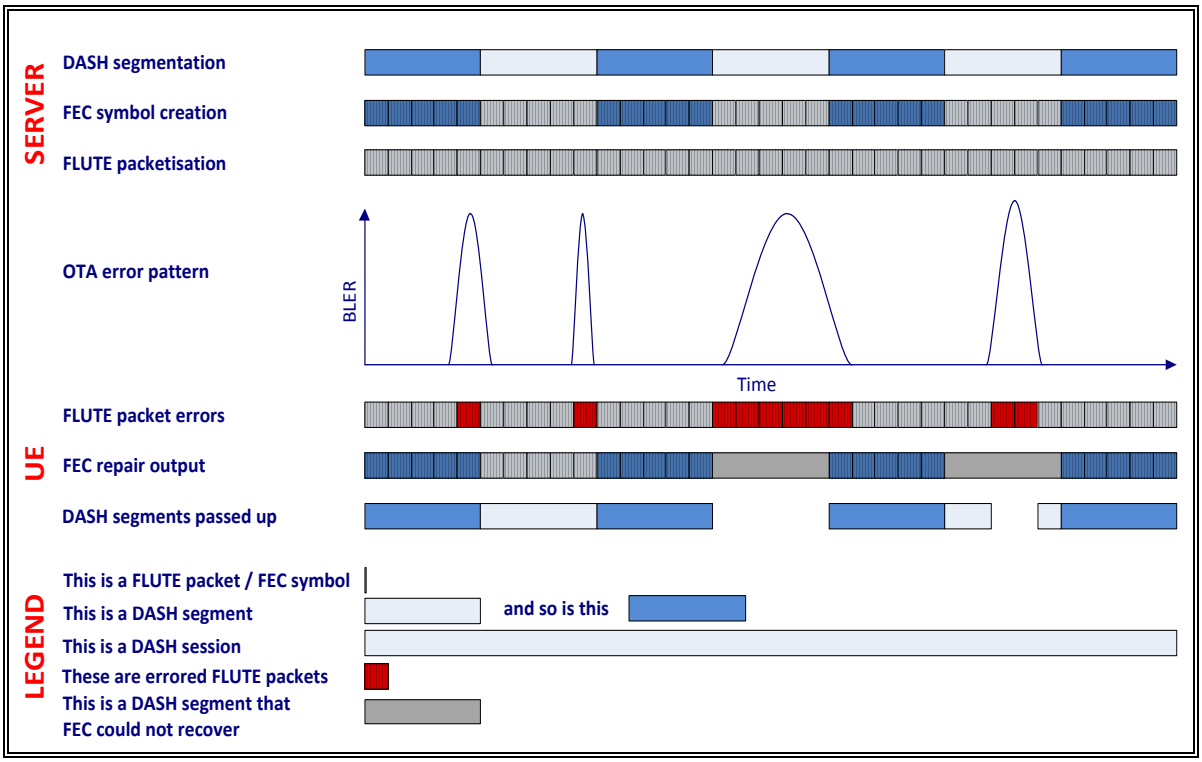

Figure 2: Operation of FLUTE with delivery of Partial Files

In this use case, in the example shown by Figure 1, a dropped file would result in a 12-second video freeze or stall. On the other hand, as illustrated in Figure 2 and highlighted by the dotted oval region, a partially recovered Segment is made available to the application. As previously stated, the mean time to a mid-segment SAP is 6 seconds, since the missing data had occurred in the second half of the Segment, and given the presence of the SAP at the beginning of the Segment, the first half of the recovered Segment is now playable. On average, this should result in a superior user experience by reducing the overall stall to half of the duration when partially recovered Segments are dropped.

5.2.6.1 Recommended Requirements

None identified.

5.2.6.2 Assumptions

None identified.

5.2.6.3 Gap Analysis

None identified.

5.2.7 Use Case#7: HTTP Delivery of Partial Resources: Generic File Downloading

A service operator offers broadcast download delivery of popular Internet multimedia content to mobile devices via eMBMS download delivery in order to avoid having each mobile device use unicast transmission bandwidth. An individual mobile device may not receive enough data from the eMBMS transmission to fully recover the multimedia content, although the mobile device may receive a substantial amount of source and repair data for the multimedia content over eMBMS.

The mobile device can optionally request portions of the multimedia content available from the Internet via unicast and combine this with data received from the eMBMS transmission to fully recover the multimedia content. To minimize the amount of data the mobile device requests for the multimedia content over the Internet, all of the data received over eMBMS, including both source and repair data, should be passed up from FLUTE to the application so that it can be combined with the data downloaded over the Internet to recover the multimedia content.

5.2.7.1 Recommended Requirements

None identified.

5.2.7.2 Assumptions

None identified.

5.2.7.3 Gap Analysis

None identified.

5.3 Impacted Technical Specification(s)

The changes required to enable the above use cases have been included in TS 26.346 [2], TS 26.247 [4], and TR 26.946 [5]:

6 IMS-based PSS and MBMS Streaming Synchronization Enhancements (IPME)

6.1 Introduction

This clause describes the EMM-IPME use cases, associated recommended requirements, assumptions, and provides a list of impacted technical specifications.

6.2 Use Cases, Recommended Requirements and Assumptions

6.2.1 Use Case#1: Media presentation synchronization across multiple UEs in IMS-based PSS services

Amy is watching a movie on her tablet PC in the car. Her brother, Paul wants to watch with her together. Amy replicates the session on her brother's tablet using inter-UE session transfer feature provided by her service provider. The movie is being simultaneously shown on Amy's and her brother's mobile device as a result of IUT replication. Furthermore Amy may watch the movie in English and her brother may watch the same movie with Spanish on their own devices.

In this use case, it may be desirable that the media presentation is synchronized across Amy's and her brother's devices so that they can watch the same scenes and discuss the story. This creates a requirement for multi-device synchronization. However it is also possible that they do not want to synchronize the media presentations on their devices. They just watch the show individually. The preference of multi-device synchronization can be selected at the session setup or at the inter-UE session transfer/replication procedure.

6.2.1.1 Recommended Requirements

- - It is recommended that there shall be mechanisms for a media session to be presented synchronously on multiple UEs when the media session is replicated on these UEs.
- - It is recommended to make it possible for UEs to decide whether they synchronously present a replicated media session.

6.2.1.2 Assumptions

None identified.

6.2.1.3 Gap Analysis

The change introduced in the technical specification described a solution for this use case using "suggestedPresentationOffset" in the bookmark. The procedures are defined for signaling and using the "suggestedPresentationOffset" in the IUT replication.

6.2.2 Use Case#2: Lip-sync across multiple UEs in IMS-based PSS services

1) Amy may want to watch the video from a device connected to a big display and listen to the audio with a headphone connected to her mobile phone.
2) Alternatively she could watch the video on her mobile phone and listen to the audio from a sound system.

The audio and video are required to be synchronized across different devices in such a collaborative session. Loss of synchronization can happen between the audio and video if the multi-device synchronization is not addressed.

6.2.2.1 Recommended Requirements

- There shall be mechanisms for the sub-streams (e.g. audio and video) in an IMS-based PSS service to be presented synchronously when the sub-streams are played back on different UEs.

6.2.2.2 Assumptions

None identified.

6.2.2.3 Gap Analysis

In general, the "suggestedPresentationOffset" can also be used for the sub-streams (e.g. audio and video) to be presented synchronously on different UEs. If the audio and video presentation on the different devices is a result of IUT replication, the signalling procedures introduced in TS 26.237 [3] can be used. However for the other lip-sync scenarios across multiple UEs in IMS-based PSS services, the signaling procedures to send the "suggestedPresentationOffset" to the audio and video devices are not specified due to complexity issue.

6.2.3 Use Case#3: Media presentation synchronization across multiple UEs in IMS-based MBMS services

A service provider wants to provide a live soccer event using IMS-based MBMS service that can potentially be accessed by many users. Amy accesses the IMS-based MBMS streaming service in the bus with her mobile device. Paul, sit across from her, watches the same game on his mobile device. A goal is scored and both, despite watching on different screens, celebrate this event at the same time. In general, people who follow the game should observe the scenes synchronously and celebrate at the same time when a goal is scored, despite watching on different screens.

6.2.3.1 Recommended Requirements

- - It is recommended that there shall be mechanisms for a MBMS user service to be presented synchronously on multiple UEs.
- - It is recommended to make it possible for UEs to decide whether they present at or behind any recommended presentation time.

6.2.3.2 Assumptions

None identified.

6.2.3.3 Gap Analysis

The change introduced in the technical specification described a solution for this use case by sending the suggestedPresentationOffset information to the UEs at IMS-based MBMS session setup to enable synchronized playout on the UEs.

6.2.4 Use Case#4: Lip-sync across multiple UEs in IMS-based MBMS services

Amy is using IMS-based MBMS service to watch a live soccer game. She listens to the audio using a headphone that is connected to her mobile device. Her mobile phone receives and plays out the audio stream. To obtain a better video quality, she uses another device connected to a big display to receive and plays out the video stream. "Lip-sync" between the audio and video is required for good quality of experience across different devices.

6.2.4.1 Recommended Requirements

- It is recommended that there shall be mechanisms for the sub-streams (e.g. audio and video) in a MBMS user service to be presented synchronously when the sub-streams are played back on different UEs.

6.2.4.2 Assumptions

None identified.

6.2.4.3 Gap Analysis

The solution described in TS 26.237 [3] can also be used for this use case by sending the suggestedPresentationOffset information to the audio and video UEs at IMS-based MBMS session setup to enable synchronized playout on the UEs.

6.3 Impacted Technical Specification(s)

The changes required have been included is TS 26.237 [3].

7 Conclusion

This technical report provides the following results of the EMM, EMM-DDE, and EMM-IPME work items:

- Descriptions of the use cases and enhancements;
- Documentation of any associated recommended requirements, assumptions, and gap analysis for each of the use cases;
- Lists of the impacted technical specifications that enable the uses cases and enhancements for each of the work items.

Annex A:
Change history

Change history							
Date	TSG #	TSG Doc.	CR	Rev	Subject/Comment	Old	New
2012-09	57				TR 26.951 provided to TSG SA#57 (for information)		1.0.0
2012-12	58	SP-120762			TR 26.951 provided to TSG SA#58 (for approval)	1.0.0	2.0.0
2012-12	58				TR 26.851 approved at TSG SA#58 Plenary meeting		11.0.0
2013-03	59	SP-130019	0001	1	EMM TR conformance to 3GPP drafting rules	11.0.0	11.1.0