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**TSG-SA WG 1 (Services) meeting #14**          **S1-0101241**
**Kobe, Japan, 5-9 November 2001**          **Agenda Item: 9.5**

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|---|---|
| **Title:** | Liaison Statement on Draft stage 1 TS for Packet Switched Streaming Service |
| **Source:** | SA1 |
| **To:** | SA2, SA3, SA4, SA5, T2 and GSM-SERG |
| **Cc:** | |

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**Attachments:** S1-011239 [Draft stage 1 TS Transparent End-to-End Packet Switched Streaming Service)

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### 1. Overall Description:

SA1 would like to inform about the continuous work on the stage 1 specification for End-to End Packet Switched Streaming Service. The number for the TS is 22.233.

SA1 will send this revision (0.3.0) to SA for information. The goal is to agree the TS in S1#15 and to send it to SA #15 for approval.

### 2. Actions:

Any comments on the work done so far are appreciated.

### 3. Date of Next SA1 Meetings:

| Title | Date | Location | Country |
|---|---|---|---|
| SA1 Adhocs | 14 – 18 Jan 02 | Phoenix | United States |
| SA1#15 | 11 – 15 Feb 02 | Saalfelden | Austria |
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# 3G TS 22.233 0.3.0 (2001-11)

*Technical Specification*

# 3rd Generation Partnership Project;
# Technical Specification Group Services and System Aspects;
# Transparent End-to-End Packet-switched Streaming Service Stage 1
# (Release 5)

Keywords

UMTS, service, streaming

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# Contents

# Foreword

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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 specification.

## Introduction

3G mobile  systems, through the increase in available bandwidth, offer new possibilities and services. One of these new services will be the ability to stream sound and movies to mobile devices.

Streaming is a mechanism whereby media content can be rendered at the same time that it is being transmitted to the client over the data network.

Streaming services are required whenever instant access to multimedia information needs to be integrated into an interactive media application. This has to be seen in contrast to other multimedia services like for instance MMS where multimedia content is delivered to the user asynchronously by means of a "message".

Interactive applications that use streaming services include on-demand and live information delivery applications. Examples of the first category are music, music videos and news-on-demand applications. Live delivery of radio and television programs are examples of the second category, this could e.g. make it possible to listen to domestic radio while abroad.

A web server works with requests for information, it delivers that particular information as fast as possible, completes the transaction, disconnects and goes on to other requests. A client connects to a web server only when it needs information. This strategy works well as long as pictures and text are to be received. If a client wants to watch video or listen to audio, the entire file must be received before it can be played. The problem is that these kinds of files can be very large thus potentially causing storage problems in the client and resulting in a long startup latency.. A streaming service improves this by allowing the media to be consumed as it is received, thereby reducing the latency and removing the need to store the media.

In addition to providing the streaming mechanism the PSS also encompasses the composition of media objects thereby allowing compelling multimedia services to be provisioned.  For instance, a mobile cinema ticketing application would allow the user to view the film trailers.

## Scope

This Technical Specification defines the stage one description of the Packet-switched Streaming Service (PSS). Stage one is the set of requirements that shall be supported for the provision of a streaming service, seen primarily from the user's and service providers' points of view but also includes the service capabilities of the PSS itself

This TS includes information applicable to network operators, service providers, terminal and network manufacturers.

This TS contains the core requirements for the Packet-switched Streaming Service (PSS), which are sufficient to enable a range of services.

# References

The following documents contain provisions that, 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.

- A non-specific reference to an ETS shall also be taken to refer to later versions published as an EN with the same number.

[1]             3G TS 22.101: "Service Principles"

[2]                                 3G TS 21.133: "3G Security; Security Threats and Requirements"

[3]                                 3G TS 22.105: "Services and Service Capabilities"

[4]                                 3G TS 26.233: "Transparent End to End Packet Switched Streaming Service (PSS) : General Description"

[5]                                 3G TS 26.234: "Transparent End to End Packet Switched Streaming Service (PSS) : Protocol and Codecs"

Editors note
21.905
user profile spec
22.115 – charging
IETF RFC 2046 – Multipurpose Internet Mail Extensions (MIME) part 2 : media types

# Definitions and abbreviations

## Definitions

**Client:** in the context of Streaming Service the client is a device (or service) that receives media objects and/or multimedia composition instructions from a server.**Media Type** : a type of media e.g. text, audio, video, graphics (see section 5.2)

**Media Object** : an instance of a media type (e.g. a picture) or a combination of instances of media types (e.g. a video clip that includes audio)

**Media Attribute** : an attribute of a media object depending on the media type e.g. the colour of a piece of text

**Multimedia Composition** : the position in time and space of media objects relative to one another

**Multimedia Services :** *insert 21.905 definition*

Server: **in the context of the Streaming Service the server is a device (or service) that delivers media objects and/or multimedia composition instructions in response to client requests.**

**Streaming** :   a mechanism whereby media content can be rendered at the same time that it is being transmitted to the client over the data network.**Streaming Service** : an alternative way of referring to the PSS.

**Terminal Profile:** Set of information about the physical capabilities of the terminal.

**User Profile:** Is the set of information necessary to provide a user with a consistent, personalised service environment, irrespective of the user's location or the terminal used (within the limitations of the terminal and the serving network).

## Abbreviations

CODEC - COder / DECoder

MMS – Multimedia Messaging Service
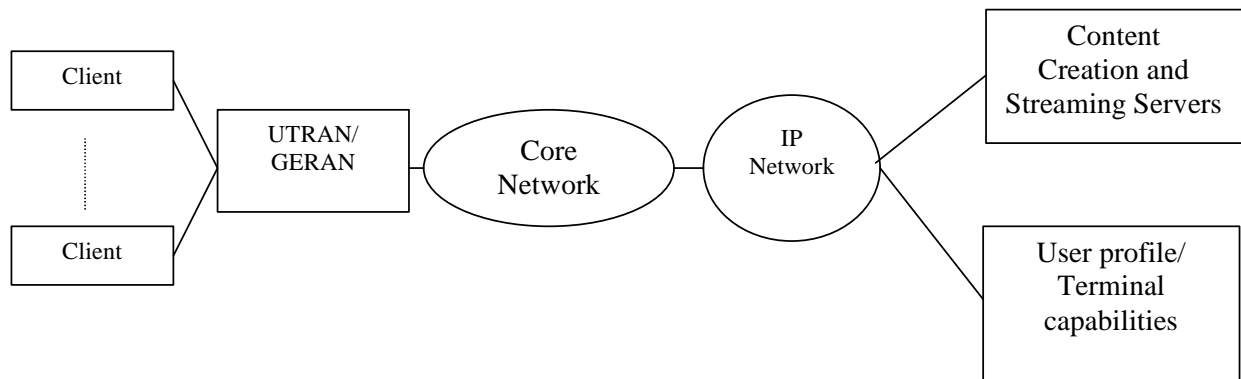PS – Packet Switched
PSS – Packet Switched Streaming Service
QoS – Quality of Service

UE – User Equipment

## Entities involved in Streaming service

Editors note : do we need this section ?  should it be re-written or deleted ?

The figure shows the basic entities involved in the Streaming service and how they connect.
Clients initiate the service and connect to the selected Streaming server. Content creation servers generates live content e.g. video from a concert. User profile and terminal capability data can be stored on a network server and will be contacted at the initial set up.  User Profile will provide the Streaming service with the user's preferences. Terminal capabilities will be used by the Streaming service to decide whether or not the client is capable of receiving the streamed content.



NOTE : further work required, see figure 2 in 26.233

## Service Requirements

### General

- The Release 5 Transparent End-to-End Packet-switched Streaming Service (PSS) shall add enhanced capabilities to the existing Transparent End-to-End Packet-switched Streaming Service (PSS)[TS26.233 and 26.234]

- The PSS uses a Client / Server model. The client controls the server by sending requests to the server, which responds to these commands.

- The PSS shall support downlink streaming..

- The PSS should support uplink streaming from a PSS client.

- The PSS shall maintain backwards compatility (i.e. a Rel4 client should be able to interoperate with a Rel5 server and vice versa).

- The Streaming Service should consider interoperability with streaming elements (protocols, formats etc) already in use in other industries (e.g. the internet).
- The Streaming Service shall support access to live content in addition to pre-authored content. E.g. ability to listen to domestic radio station whilst abroad.

- The Streaming Service shall:

  - use open standards where these are available for Streaming service requirements
  - use standard procedures and interfaces to avoid interoperability problems
  - use extensions to existing standards if needed

### Media Types

- The Streaming Service should support multiple media types (ref. …mime doc)to enable rich, compelling multimedia services, for example:

  - Audio (including speech)
  - Video
  - Still image

- Graphics (2D and 3D) including animation
- Text
  - Plain text
  - Formatted text e.g. size, color, font
- Synthetic audio (e.g. MIDI)
- Metadata e.g. indication that text has been supplied for the hard of hearing

- The number of implementations of each media type shall be kept to a minimum, considering the implementation impact to the terminals, interoperability, contents mobility and backward compatibility.
- The Streaming Service shall share media codecs with other 3G multimedia services to allow easy interworking when needed.
- The Streaming Service should be able to call upon a font that is available across all terminals, either by use of an agreed default font in all terminals or by downloading the font prior to display.  This requirement applies to formatted text only and is dependent upon the terminal capability.

## Multimedia Composition and Interaction

- The PSS shall enable the creation of  multimedia services incorporating multiple media objects.
- The PSS shall provide the capability to position and synchronize media objects on the client.
- The PSS shall support flowing/scrolling of text or graphics in any direction.
- The PSS shall provide the capability to specify the media attributes - text (e.g. color, size, font, format) or graphics (e.g. size, colour) -  in relation to the timebase of other media objects
- The PSS shall provide the capability to update media objects dynamically. E.g. substitution of a news report with a more up to date version.
- The PSS should provide the capability to update the attributes of media objects dynamically. E.g. colour coded pre-paid indicator to indicate credit level.
- The PSS should provide the capability to update the multimedia composition dynamically.  E.g. ??
- The PSS shall provide the capability that allows the user to navigate through or interact with the multimedia service.  E.g. Once a user has downloaded a "tour of London" application the user has the ability to navigate through London and see video clips or hear audio descriptions of points of interest in London.

- The PSS shall provide the capability that allows clients of different capabilities to maximise the user experience.  E.g. if a client did not support graphic animations it could render a single image.

## Transport

- The streaming service transport shall be provided by the PS Domain.

- Quality of Service  (e.g. time delay) requirements shall be in accordance with requirements in 22.105 (ref. 3)

Editors note : 22.105 needs to be updated to include streaming requirements

- The Streaming service should be able to work over different QoS bearers.

- The PSS shall provide a mechanism whereby the client is sent a list of media encoding bit rates and the client determines which one to use based on the network service bearers offered and the user preferences.

- The PSS client shall be capable of requesting an appropriate level of QoS for the session.  The QoS supplied may be limited by the local operator's access policy and/or network functionality.

- The PSS should provide mechanisms for streaming servers and clients to adapt to the network conditions in order to achieve significant improvement in the quality of streaming, e.g. using information on end-to-end transport quality from the network.

- The PSS should provide a reliable delivery mechanism that enables the user to receive the content without any errors due to the transport mechanism.

## Service Personalization

- The Streaming service should support the ability for the client to have specific preferences described in the user profile.  For example, if the user wants to watch a news show the preferred language (speech or subtitles) is specified in the user profile

- The Streaming service shall support a basic set of terminal capabilities.

- For the purpose of optimized presentation of the media streaming, PSS shall include capability exchange and negotiation mechanisms on server/client capabilities and user preferences at the session set up.

- The client should be able to send user preferences to the server during a streaming session. E.g. the user may toggle between mono and stereo sound.

  Editors note : Check User Profile work

## Service Management

User's control of the service:

The client shall initiate the Streaming Service.

- The user shall have the possibility to stop the Streaming service after it has been invoked.
- The user shall have the possibility to pause the Streaming service after it has been invoked.

  e.g. if a user has activated the Streaming service and then gets a phone call, he/she shall be able to decide whether or not he/she wants the Streaming service to continue. After a pause the user can choose to resume the streaming service.

  - ♦
  - ♦ The PSS should be able to simultaneously handle the streaming service and conversational (circuit or packet?) services (e.g. voice and video telephony)
- The user shall have the possibility of jumping to another point within the media clip (i.e., random access)
- The user should be able to search through media content whilst viewing the content.
-
- If the content is available under different formats corresponding to the terminal capabilities and user preferences, the client should have the opportunity to choose the format for which the content will be streamed.  Assuming the user has already set the user profile and the client is aware of this.

Service Provider's management of the service:

- The Streaming service should be gracefully disconnected if the client is not capable of handling the streamed content.

- The end user should be notified if the Streaming service is unavailable.

## Security

The user shall be able to use the Streaming service in a secure manner. Mechanisms shall be provided to ensure that the media objects are only sent to and accessed by the intended end-user(s).

The "Security Threats and Requirements" specified in 21.133 [2] shall not be compromised.

- Streaming services shall support end-to-end security (e.g. between the server and the Streaming client ).

## Charging

Streaming services should support various charging mechanisms,

It shall be possible to include the following streaming specific data in the CDRs as charging information if available :

-message type, length etc

-time of start of delivery

-duration

-Streaming service sender / -recipient

-number of Streaming events sent

-number of Streaming events received.

-Media

Editors note : check content based charging work in other groups

## Digital Rights Management

DRM might be desirable depending on content type and value, this chapter is for further study.

- The Streaming service may support different levels of DRM

- The Streaming client should be able to handle content using DRM

Editors note : what is happing on DRM in release 5 ?

## Interworking

- The PSS shall define a common file format (common to all download mechanisms) for easy interworking with other multimedia delivery services defined in 3GPP (e.g. MMS).

- The PSS shall Interwork with MMS.  Interworking with MMS is especially important because there are application scenarios where media delivery via a streaming service could be replaced by media delivery via MMS and vice versa..

NOTE : The relationship with Multimedia Broadcast/Multicast Service (MBMS) and Push is for further study.

## Annex A (informative):
## Change history

| V.0.1.0 | May 2001 | First Draft (Presented at TSG-SA-WG1 #12 ) |
|---------|----------|---------------------------------------------|
| v.0.2.0 | July 2001 | Second Draft (Presented at TSG-SA-WG1 #13) |
| v.0.3.0 | November 2001 | Third Draft (Presented at TSG-SA-WG1 #14) |
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| Change history | | | | | | | | | | |
|---------|---------|---------|------|----|-----|-----|-----|------------------|-----|-----|
| TSG SA# | SA Doc. | SA1 Doc | Spec | CR | Rev | Rel | Cat | Subject/Comment | Old | New |
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## Annex B (informative) : PSS Examples

Some domains may benefit from the convenient, ubiquitous and more reachable mobile device. A second challenge for operators and service providers is to utilise the 'mobile' effect for providing value-added services. We believe successful wireless data services will exploit the unique mobile characteristics. A non-exhaustive list of these mobile service characteristics can be presented as follows:

- Content everywhere: Locally interactive content and remote interaction (back-channels) in relation to interactive streamed media, including rewind/pause functions will define the key features for providing attractive and friendly contents for distance learning applications and other information services (news, financial, etc). Scanning headlines of daily newspapers is already about to become a popular 'waiting time' activity. In the learning context, one may imagine that a student will be able to select on his portal page the school section from which he will be able to view a list of classes that will take place and to preview current live lectures, required readings, etc.

- Lifestyle facilitators: When discovering a tourism site one may want access to leisure and travel information (e.g., flight deals, package holidays, quality hotels, fun activities, etc). During weekend outings and holidays, a common use case will be the following: one uses the location finder to find the nearest shop where he can find the desired object at the desired price, a navigation guide helps him to determine how he will get to the shop or store.

- Entertainment services: Gaming is already being touted as the biggest generator of minutes of use for interactive cellular services in Asia and Europe. Features such as streamed 2D graphics, 3D objects, complex animations and multi-user technologies will attract more subscribers by allowing richer experiences with more fancy navigation schemes. As an example of future scenario, when online-games will become very popular, 3D-graphics of the new multimedia mobile phones allow a bunch of fancy games. Players can join multi-user games, some use a virtual location as well as the real location in a funny interactive way

This set of multimedia applications should be foreseen for the Release 5 and the future releases.

**Service Examples**

All these service examples could use or be enhanced by PSS.

General Format  (see TR 22.941, UMTS reports)
- Motivation
- High level service description
- Business model
- Relation to PSS
- User perspective
- Service specific considerations
- Charging
- Roaming

**Infotainment**

Video on demand
Music on demand
Radio on demand
TV on demand ?
Multimedia Travel Guide

Karaoke – song words change colour to indicate when to sing
Multimedia information services :
- Sports
- News
- Stock quotes
- Traffic

Weather cams – gives information on other part of country or the world

**Edutainment**

Distance learning – video stream of teacher or learning material together with teachers voice or audio track.

How to ? service – manufacturers show how to program the VCR at home
**Corporate**

Field engineering information – junior engineer gets access to on line manuals to show how to repair the central heating system

Surveillance of business premises or private property (real-time and non real-time)
**M-commerce**

Multimedia Cinema ticketing application
On line shopping – product presentations could be streamed to the user and then the user could buy on line.

# 3G TS 22.233 0.3.0 (2001-11)

**3rd Generation Partnership Project;**
**Technical Specification Group Services and System Aspects;**
**Transparent End-to-End Packet-switched Streaming Service**
**Stage 1**
**(Release 5)**

Keywords

UMTS, service, streaming

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In addition to providing the streaming mechanism the PSS also encompasses the composition of media objects thereby allowing compelling multimedia services to be provisioned. For instance, a mobile cinema ticketing application would allow the user to view the film trailers.

# 1 Scope

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Editors note

21.905

user profile spec

22.115 – charging

IETF RFC 2046 – Multipurpose Internet Mail Extensions (MIME) part 2 : media types

# 3 Definitions and abbreviations

## 3.1 Definitions

**Client:** in the context of Streaming Service the client is a device (or service) that receives media objects and/or multimedia composition instructions from a server.**Media Type** : a type of media e.g. text, audio, video, graphics (see section 5.2)

**Media Object** : an instance of a media type (e.g. a picture) or a combination of instances of media types (e.g. a video clip that includes audio)

**Media Attribute** : an attribute of a media object depending on the media type e.g. the colour of a piece of text

**Multimedia Composition** : the position in time and space of media objects relative to one another

**Multimedia Services :** *insert 21.905 definition*

Server: **in the context of the Streaming Service the server is a device (or service) that delivers media objects and/or multimedia composition instructions in response to client requests.**

**Streaming** : a mechanism whereby media content can be rendered at the same time that it is being transmitted to the client over the data network.**Streaming Service** : an alternative way of referring to the PSS.

**Terminal Profile:** Set of information about the physical capabilities of the terminal.

**User Profile:** Is the set of information necessary to provide a user with a consistent, personalised service environment, irrespective of the user's location or the terminal used (within the limitations of the terminal and the serving network).

# 3.2   Abbreviations

CODEC - COder / DECoder

MMS – Multimedia Messaging Service

PS – Packet Switched

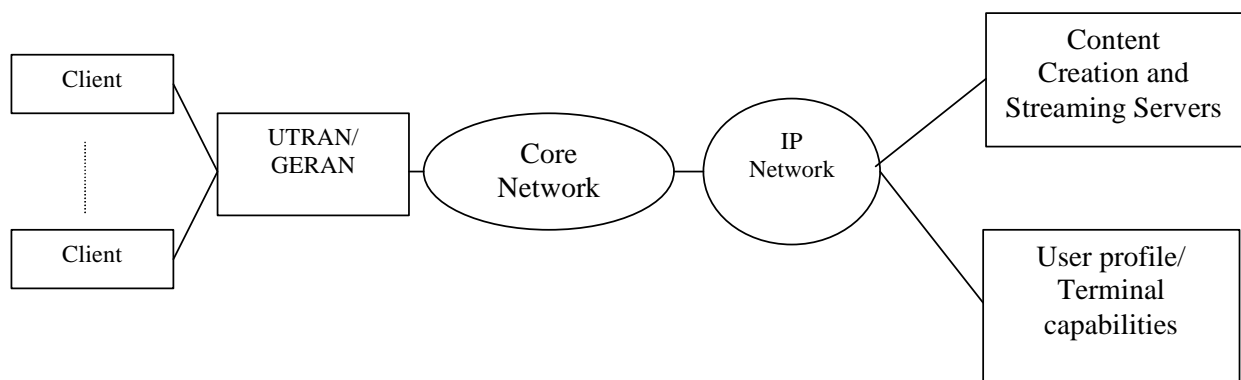PSS – Packet Switched Streaming Service

QoS – Quality of Service

UE – User Equipment

# 4 Entities involved in Streaming service

Editors note : do we need this section ?  should it be re-written or deleted ?

The figure shows the basic entities involved in the Streaming service and how they connect.

Clients initiate the service and connect to the selected Streaming server. Content creation servers generates live content e.g. video from a concert. User profile and terminal capability data can be stored on a network server and will be contacted at the initial set up.  User Profile will provide the Streaming service with the user's preferences. Terminal capabilities will be used by the Streaming service to decide whether or not the client is capable of receiving the streamed content.



NOTE : further work required, see figure 2 in 26.233

# 5 Service Requirements

## 5.1 General

- The Release 5 Transparent End-to-End Packet-switched Streaming Service (PSS) shall add enhanced capabilities to the existing Transparent End-to-End Packet-switched Streaming Service (PSS)[TS26.233 and 26.234]

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  - use open standards where these are available for Streaming service requirements

  - use standard procedures and interfaces to avoid interoperability problems

  - use extensions to existing standards if needed

## 5.2   Media Types

- The Streaming Service should support multiple media types (ref. …mime doc)to enable rich, compelling multimedia services, for example:

  - Audio (including speech)

  - Video

  - Still image

  - Graphics (2D and 3D) including animation

  - Text

    - Plain text

    - Formatted text e.g. size, color, font

  - Synthetic audio (e.g. MIDI)

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## 5.3   Multimedia Composition and Interaction

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## 5.4   Transport

- The streaming service transport shall be provided by the PS Domain.

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Editors note : 22.105 needs to be updated to include streaming requirements

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- The PSS shall provide a mechanism whereby the client is sent a list of media encoding bit rates and the client determines which one to use based on the network service bearers offered and the user preferences.

- The PSS client shall be capable of requesting an appropriate level of QoS for the session.  The QoS supplied may be limited by the local operator's access policy and/or network functionality.

- The PSS should provide mechanisms for streaming servers and clients to adapt to the network conditions in order to achieve significant improvement in the quality of streaming, e.g. using information on end-to-end transport quality from the network.

- The PSS should provide a reliable delivery mechanism that enables the user to receive the content without any errors due to the transport mechanism.

## 5.5   Service Personalization

- The Streaming service should support the ability for the client to have specific preferences described in the user profile.  For example, if the user wants to watch a news show the preferred language (speech or subtitles) is specified in the user profile

- The Streaming service shall support a basic set of terminal capabilities.

- For the purpose of optimized presentation of the media streaming, PSS shall include capability exchange and negotiation mechanisms on server/client capabilities and user preferences at the session set up.

- The client should be able to send user preferences to the server during a streaming session. E.g. the user may toggle between mono and stereo sound.

Editors note : Check User Profile work

## 5.6   Service Management

User's control of the service:

The client shall initiate the Streaming Service.

- The user shall have the possibility to stop the Streaming service after it has been invoked.

- The user shall have the possibility to pause the Streaming service after it has been invoked.

  e.g. if a user has activated the Streaming service and then gets a phone call, he/she shall be able to decide whether or not he/she wants the Streaming service to continue. After a pause the user can choose to resume the streaming service.

  ♦

  ♦ The PSS should be able to simultaneously handle the streaming service and conversational (circuit or packet?) services (e.g. voice and video telephony)

- The user shall have the possibility of jumping to another point within the media clip (i.e., random access)

- The user should be able to search through media content whilst viewing the content.

-

- If the content is available under different formats corresponding to the terminal capabilities and user preferences, the client should have the opportunity to choose the format for which the content will be streamed. Assuming the user has already set the user profile and the client is aware of this.

Service Provider's management of the service:

- The Streaming service should be gracefully disconnected if the client is not capable of handling the streamed content.

- The end user should be notified if the Streaming service is unavailable.

# 6 Security

The user shall be able to use the Streaming service in a secure manner. Mechanisms shall be provided to ensure that the media objects are only sent to and accessed by the intended end-user(s).

The "Security Threats and Requirements" specified in 21.133 [2] shall not be compromised.

- Streaming services shall support end-to-end security (e.g. between the server and the Streaming client ).

# 7 Charging

Streaming services should support various charging mechanisms,

It shall be possible to include the following streaming specific data in the CDRs as charging information if available :

- message type, length etc

- time of start of delivery

- duration

- Streaming service sender / -recipient

- number of Streaming events sent

- number of Streaming events received.

- Media

<span style="color:red">Editors note : check content based charging work in other groups</span>

# 8 Digital Rights Management

DRM might be desirable depending on content type and value, this chapter is for further study.

- The Streaming service may support different levels of DRM

- The Streaming client should be able to handle content using DRM

<span style="color:red">Editors note : what is happing on DRM in release 5 ?</span>

# 9 Interworking

- The PSS shall define a common file format (common to all download mechanisms) for easy interworking with other multimedia delivery services defined in 3GPP (e.g. MMS).

- The PSS shall Interwork with MMS.  Interworking with MMS is especially important because there are application scenarios where media delivery via a streaming service could be replaced by media delivery via MMS and vice versa..

<span style="color:red">NOTE : The relationship with Multimedia Broadcast/Multicast Service (MBMS) and Push is for further study.</span>

# Annex A (informative):
# Change history

| V.0.1.0 | May 2001 | First Draft (Presented at TSG-SA-WG1 #12 ) |
|---------|----------|--------------------------------------------|
| v.0.2.0 | July 2001 | Second Draft (Presented at TSG-SA-WG1 #13) |
| v.0.3.0 | November 2001 | Third Draft (Presented at TSG-SA-WG1 #14) |
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| Change history | | | | | | | | | | |
|---------|---------|---------|------|----|-----|-----|-----|-----------------|-----|-----|
| TSG SA# | SA Doc. | SA1 Doc | Spec | CR | Rev | Rel | Cat | Subject/Comment | Old | New |
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# Annex B (informative) : PSS Examples

Some domains may benefit from the convenient, ubiquitous and more reachable mobile device. A second challenge for operators and service providers is to utilise the 'mobile' effect for providing value-added services. We believe successful wireless data services will exploit the unique mobile characteristics. A non-exhaustive list of these mobile service characteristics can be presented as follows:

- Content everywhere: Locally interactive content and remote interaction (back-channels) in relation to interactive streamed media, including rewind/pause functions will define the key features for providing attractive and friendly contents for distance learning applications and other information services (news, financial, etc). Scanning headlines of daily newspapers is already about to become a popular 'waiting time' activity. In the learning context, one may imagine that a student will be able to select on his portal page the school section from which he will be able to view a list of classes that will take place and to preview current live lectures, required readings, etc.

- Lifestyle facilitators: When discovering a tourism site one may want access to leisure and travel information (e.g., flight deals, package holidays, quality hotels, fun activities, etc). During weekend outings and holidays, a common use case will be the following: one uses the location finder to find the nearest shop where he can find the desired object at the desired price, a navigation guide helps him to determine how he will get to the shop or store.

- Entertainment services: Gaming is already being touted as the biggest generator of minutes of use for interactive cellular services in Asia and Europe. Features such as streamed 2D graphics, 3D objects, complex animations and multi-user technologies will attract more subscribers by allowing richer experiences with more fancy navigation schemes. As an example of future scenario, when online-games will become very popular, 3D-graphics of the new multimedia mobile phones allow a bunch of fancy games. Players can join multi-user games, some use a virtual location as well as the real location in a funny interactive way

This set of multimedia applications should be foreseen for the Release 5 and the future releases.

**Service Examples**

All these service examples could use or be enhanced by PSS.

General Format  (see TR 22.941, UMTS reports)

- Motivation

- High level service description

- Business model

- Relation to PSS

- User perspective

- Service specific considerations

- Charging

- Roaming

**Infotainment**

Video on demand

Music on demand

Radio on demand

TV on demand ?

Multimedia Travel Guide

Karaoke – song words change colour to indicate when to sing

Multimedia information services :

- Sports

- News

- Stock quotes

- Traffic

Weather cams – gives information on other part of country or the world

**Edutainment**

Distance learning – video stream of teacher or learning material together with teachers voice or audio track.

How to ? service – manufacturers show how to program the VCR at home

**Corporate**

Field engineering information – junior engineer gets access to on line manuals to show how to repair the central heating system

Surveillance of business premises or private property (real-time and non real-time)

**M-commerce**

Multimedia Cinema ticketing application

On line shopping – product presentations could be streamed to the user and then the user could buy on line.