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Technical Specification

**Satellite Earth Stations and Systems (SES);
Satellite Component of UMTS/IMT-2000;
Multimedia Broadcast/Multicast Services;
Part 1: Services definitions**



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Foreword

This Technical Specification (TS) has been produced by ETSI Technical Committee Satellite Earth Stations and Systems (SES).

The present document is part 1 of a multi-part deliverable covering Satellite Earth Stations and Systems (SES); Satellite Component of UMTS/IMT-2000; Multimedia Broadcast/Multicast Services, as identified below:

- Part 1: "Services definitions";**
- Part 2: "Architecture and functional description";
- Part 3: "Introduction in the Radio Access Network (RAN)";
- Part 4: "Interworking with terrestrial UMTS networks";
- Part 5: "Performances over the radio interface";
- Part 6: "Security".

Introduction

S-UMTS stands for the Satellite component of the Universal Mobile Telecommunication System. S-UMTS systems will complement the terrestrial UMTS (T-UMTS) and inter-work with other IMT-2000 family members through the UMTS core network. S-UMTS will be used to deliver 3rd generation mobile satellite services (MSS) utilizing either low (LEO) or medium (MEO) earth orbiting, or geostationary (GEO) satellite(s). S-UMTS systems are based on terrestrial 3GPP specifications and will support access to GSM/UMTS core networks.

NOTE 1: The term T-UMTS will be used in the present document to further differentiate the Terrestrial UMTS component.

Due to the differences between terrestrial and satellite channel characteristics, some modifications to the terrestrial UMTS (T-UMTS) standards are necessary. Some specifications are directly applicable, whereas others are applicable with modifications. Similarly, some T-UMTS specifications do not apply, whilst some S-UMTS specifications have no corresponding T-UMTS specification.

Since S-UMTS is derived from T-UMTS, the organization of the S-UMTS specifications closely follows the original 3rd Generation Partnership Project (3GPP) structure.

An S-UMTS system is defined by the combination of a family of S-UMTS specifications and 3GPP specifications, as follows:

- If an S-UMTS specification exists it takes precedence over the corresponding 3GPP specification (if any). This precedence rule applies to any references in the corresponding 3GPP specifications.

NOTE 2: Any references to 3GPP specifications within the S-UMTS specifications are not subject to this precedence rule. For example, an S-UMTS specification may contain specific references to the corresponding 3GPP specification.

- If an S-UMTS specification does not exist, the corresponding 3GPP specification may or may not apply. The exact applicability of the complete list of 3GPP specifications shall be defined at a later stage.

1 Scope

The present document specifies the set of requirements for the support of Satellite Multimedia Broadcast Multicast Services.

The present document includes information applicable to network operators, content providers, terminal and network manufacturers.

Broadcast and Multicast are methods for transmitting data-grams from a single source to several destinations (point-to-multipoint).

It is envisaged that for some applications, multiple users can receive the same data at the same time. The benefit of multicast and broadcast in the network is that the data is sent once on each link. For example, a network operator will send data to a satellite hub in order satellite broadcasts data regardless of the number of UEs that wish to receive it. The benefit of multicast and broadcast on the air interface is that many users can receive the same data on a common channel, thus not clogging up the satellite air interface with multiple transmissions of the same data.

With increasing use of high bandwidth applications in third generation mobile systems, especially with a large number of users receiving the same high data rate services, terrestrial cellular networks and transport infrastructure are on the way of being overloaded. Satellite broadcast and multicast is an efficient alternative to relieve terrestrial networks and to extend service coverage in low dense and sparse population areas.

2 Void

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the following terms and definitions apply:

broadcast mode: part of S-MBMS that supports broadcast services.

broadcast service: unidirectional point-to-multipoint service in which data is efficiently transmitted from a single source to multiple UEs in the associated broadcast service area

NOTE: Broadcast services may be received by all users who have enabled the specific broadcast service locally on their UE and who are in the broadcast area defined for the service.

broadcast service area: area in which a specific broadcast service is available. It is defined individually per broadcast service

NOTE: The broadcast service area may represent the coverage area of the entire PLMN (satellite coverage areas), or part(s) of the PLMN's coverage area (spot coverage area). The broadcast service area is the sum of all local broadcast areas offering the same service.

broadcast session: continuous and time-bounded reception of a broadcast service by the UE.

NOTE: A single broadcast service can only have one broadcast session at any time. A broadcast service may consist of multiple successive broadcast sessions.

local broadcast area: area of a broadcast service, where the service content is the same

NOTE: One broadcast service may have different content in different local broadcast areas.

local multicast area: area of a multicast service, where the service content is the same

NOTE: One multicast service may have different content in different local multicast areas.

Mobile Station (MS): Defined in TS 124 002 (see Bibliography).

NOTE: The abbreviation "UE" in this specification refers both to MS and User Equipment.

Multimedia Broadcast/Multicast Service (S-MBMS): unidirectional point-to-multipoint service in which data is transmitted from a single source entity to a group of users in a specific area. The MBMS has two modes: Broadcast mode and Multicast mode.

multicast joining: process by which a user joins a multicast group

multicast mode: part of S-MBMS that supports multicast services

multicast service: unidirectional point-to-multipoint service in which data is efficiently transmitted from a single source to a multicast group in the associated multicast service area. Multicast services can only be received by such users that are subscribed to the specific multicast service and have joined the multicast group associated with the specific service.

multicast service area: area in which a specific multicast service is available. It is defined individually per multicast service. The multicast service area may represent the coverage area of an entire PLMN, or part(s) of the PLMN's coverage area. The multicast service area is the sum of all local multicast areas offering the same service.

multicast session: continuous and time-bounded reception of a multicast service by the UE. A single multicast service can only have one multicast session at any time. A multicast service may consist of multiple successive multicast sessions.

multicast subscription: process by which a user subscribes or is subscribed to a multicast subscription group and thereby is authorized to join certain multicast services

NOTE: Multicast subscription is performed either upon user selection or due to home environment initiation.

multicast subscription group: group of users who are subscribed to a certain MBMS in multicast mode and therefore authorized to join and receive multicast services associated with this group

multicast transmission activation: process by which the network activates the transmission of Multicast data

Satellite Multimedia Broadcast/Multicast Service (S-MBMS): MBMS delivered by satellite

3.2 Abbreviations

For the purposes of the present document, the following abbreviations apply:

CS	Circuit Switching
DRM	Digital Rights Management
HE	Home Environment
HE-VASP	Home Environment Value Added Service Provider
IMR	Intermediate Module Repeater
MBMS	Multimedia Broadcast/Multicast Service
ME	Mobile Entity
MMS	Multimedia Message Service
MS	Mobile Station
PLMN	Public Land Mobile Network
PPS	Protocol and Parameter Select
PS	Packet Switching
PSS	Packet-switched Streaming Service
QoS	Quality of Service
RAN	Radio Access network
S-MBMS	Satellite Multimedia Broadcast Multicast Service
UE	User Equipment
UICC	UMTS Integrated Circuit Card
USRAN	UMTS Satellite Radio Access Network

4 General description of a satellite multimedia broadcast/multicast service (S-MBMS)

Point to multipoint services allow data from a single source entity to be transmitted to multiple endpoints. These services are expected to be used extensively and satellite broadcast capability to a large population makes satellite a good candidate to complement terrestrial networks.

S-MBMS is a unidirectional point to multipoint bearer service in which data is transmitted from a single source entity (satellite) to multiple recipients. It is anticipated that other services will use these bearer capabilities.

Two modes of operation are defined:

- the broadcast mode.
- The multicast mode.

4.1 Broadcast mode

The broadcast mode is a unidirectional point-to-multipoint transmission of multimedia data (e.g. text, audio, picture, video) from a single source entity to all users in a broadcast service area. The broadcast mode is intended to efficiently use radio/network resources. Data is transmitted over a common radio channel. Data is transmitted in the broadcast service area as defined by the network (home environment).

S-MBMS data transmission should adapt to different radio resource availability, e.g. by reducing the bit rate of the S-MBMS data.

A broadcast service received by the UE, involves one or more successive broadcast sessions. A broadcast service might, for example, consist of a single on-going session (e.g. a media stream) or may involve several intermittent sessions over an extended period of time (e.g. messages).

An example of a service using the broadcast mode could be advertising or be a welcome message to the network or mobile TV. As not all users attached to the network may wish to receive these messages then the user shall be able to enable/disable the reception of these broadcast service on his UE.

The broadcast mode differs from the multicast mode in that there is no specific requirement to activate or subscribe to the S-MBMS in broadcast mode.

The broadcast mode should allow terminals to minimize their power consumption.

It is expected that charging data for the end user will not be generated for this mode at transport service layer. Charging data related to security procedures for the end user at User Service layer may be generated. The reception of the traffic in the broadcast mode is not guaranteed. The receiver may be able to recognize data loss.

Figure 1 gives an example of how a network can be configured to broadcast a variety of services to users within the associated broadcast service area.

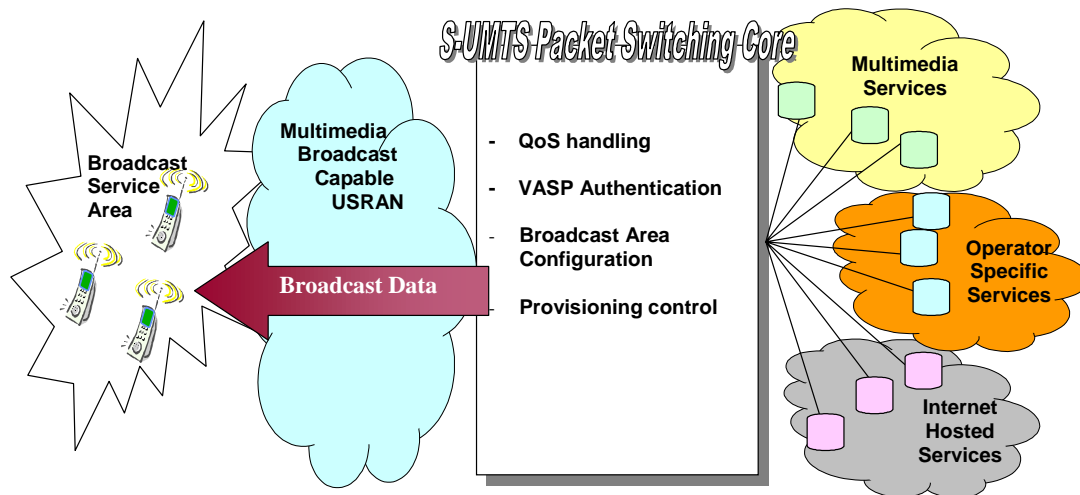


Figure 1: Broadcast Mode Network

4.2 Multicast mode

The multicast mode allows the unidirectional point-to-multipoint transmission of multimedia data (e.g. text, audio, picture, video) from a single source point to a multicast group in a multicast service area. The multicast mode is intended to efficiently use radio/network resources, e.g. data is transmitted over a common radio channel. Data is transmitted in the multicast service area as defined by the network (Home Environment). In the multicast mode there is the possibility for the network to selectively transmit to satellite spots within the multicast service area which contain members of a multicast group.

S-MBMS data transmission should adapt to different RAN capabilities or different radio resource availability, e.g. by reducing the bit rate of the S-MBMS data.

A multicast service received by the UE involves one or more successive multicast sessions. A multicast service might, for example, consist of a single on-going session (e.g. a multimedia stream) or may involve several intermittent multicast sessions over an extended period of time (e.g. messages).

An example of a service using the multicast mode could be a football results service for which a subscription is required.

Unlike the broadcast mode, the multicast mode generally requires a subscription to the multicast subscription group and then the user joining the corresponding multicast group. The subscription and group joining may be made by the PLMN operator, the user or a third party on their behalf (e.g. company). Unlike the broadcast mode, it is expected that charging data for the end user will be generated for this mode. All of these specific multicast features and the related signalling protocol involve use of point-to-point connections. Point to point connections may be provided either by satellite bi-directional link or by 2G/3G terrestrial access network. Reception of multicast services cannot be guaranteed over the access network. For many applications and services guaranteed data reception may be carried out by higher layer services or applications which make use of S-MBMS.

Multicast mode should allow terminals to minimize their power consumption.

Multicast mode shall be inter-operable with IETF IP Multicast. This could allow the best use of IP service platforms to help maximize the availability of applications and content so that current and future services can be delivered in a more resource efficient manner.

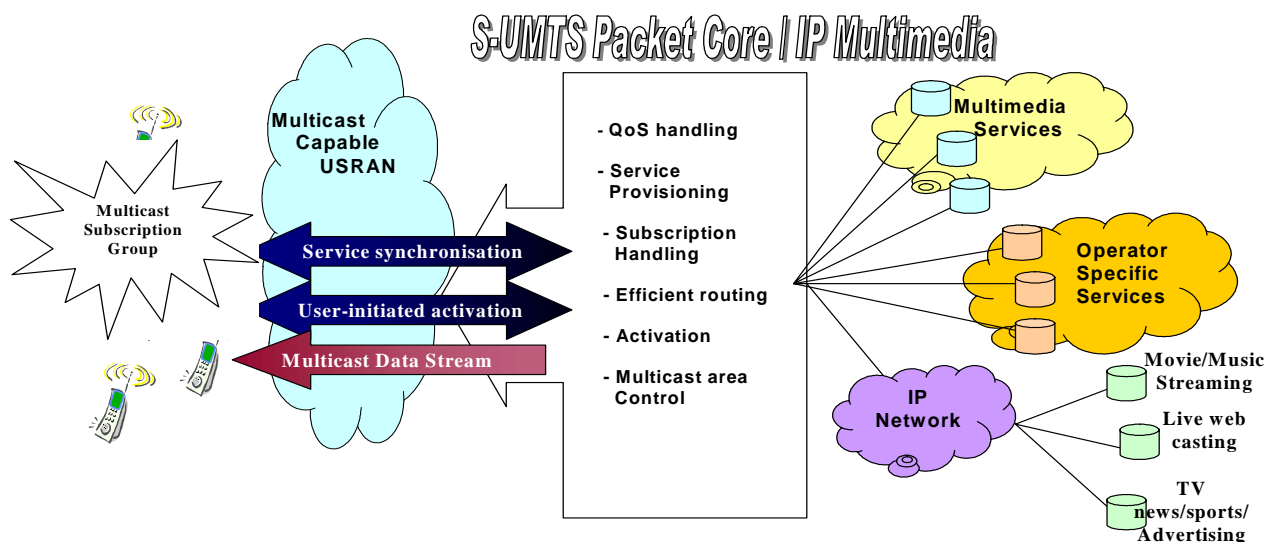


Figure 2: Multicast Mode Network

4.2.1 Multicast subscription and reception

The following is the expected sequence for the user to be able to access the S-MBMS multicast mode:

- 1) The user subscribes or is subscribed to a multicast subscription group which is uniquely identified and thereby becomes a member of that group. The subscription may be continuous (e.g. as defined by the subscriber's contract), time-limited, or generated by the subscriber on a one-time basis.
- 2) The user discovers, or becomes aware (e.g. via service announcements), that there are multicast services currently active, or multicast services that will become active at some time later, at the user's current location (spot coverage).
- 3a) The user selects a multicast service and hence the user joins the corresponding multicast group. The user should be able to join a multicast service as soon as possible after announcement of the service.
- 3b) As an alternative, the Home Environment can join the user to the selected multicast group on behalf of the user, that has previously subscribed to this multicast group.

Signaling exchange between the UE and the network might not be necessary in some cases, e.g. in the case of network congestion or return link unavailability.

- 4) If the transmission is not already in progress the network starts transmitting the corresponding multicast content. Alternatively, the transmission may start at a later time.
- 5) The network may optionally select to set up unicast (point to point) connections to some users, e.g. if there are insufficient users to justify multicasting.
- 6) The UE starts receiving the multicast data associated with the multicast group(s) it has joined.
- 7) The user may choose to stop receiving a selected multicast service and thereby leaves the multicast group. The user may also select to continue (or not) to receive service announcements for this multicast subscription group.
- 8) The user may unsubscribe or be unsubscribed from the multicast subscription group and stop receiving both the multicast data and future service announcements for this multicast subscription group.

The Home Environment shall be able to remove a user from a multicast group (deactivation) and if required remove the subscriber from the multicast subscription group (un-subscription). This is required to allow the operator to bar service.

4.3 Discovery and announcement of S-MBMS services

The user shall be able to find out or be informed about S-MBMS services available in the spot coverage area. The network shall support service announcements both for the broadcast and multicast mode of S-MBMS in order to enable the user to be informed about the S-MBMS services available currently, or some time later. Users should also be able to discover and monitor S-MBMS service availability, e.g. using a URL.

5 Classification of S-MBMS User Services

There exist many services and applications that can be provided over the application independent S-MBMS transport. It is not necessary to standardize specific end user services because the deployment of particular applications and services over the capabilities provided by the S-UMTS system is operator specific and outside the scope of standardization. However, it is possible to classify S-MBMS User Services according to the method used to distribute these services.

5.1 Service types

5.1.1 Streaming services

A continuous data flow providing a stream of continuous media (i.e. audio and video) is a basic S-MBMS user service. Like digital video broadcasting, supplementary information of text and/or still images (static media) is also important. For example, if text includes URLs of some content on the Internet, a user can easily access the content without entering the URL for herself. Still images may also be used for banner images that advertise some product or service. These static media need to be synchronized and displayed with audio/video streams.

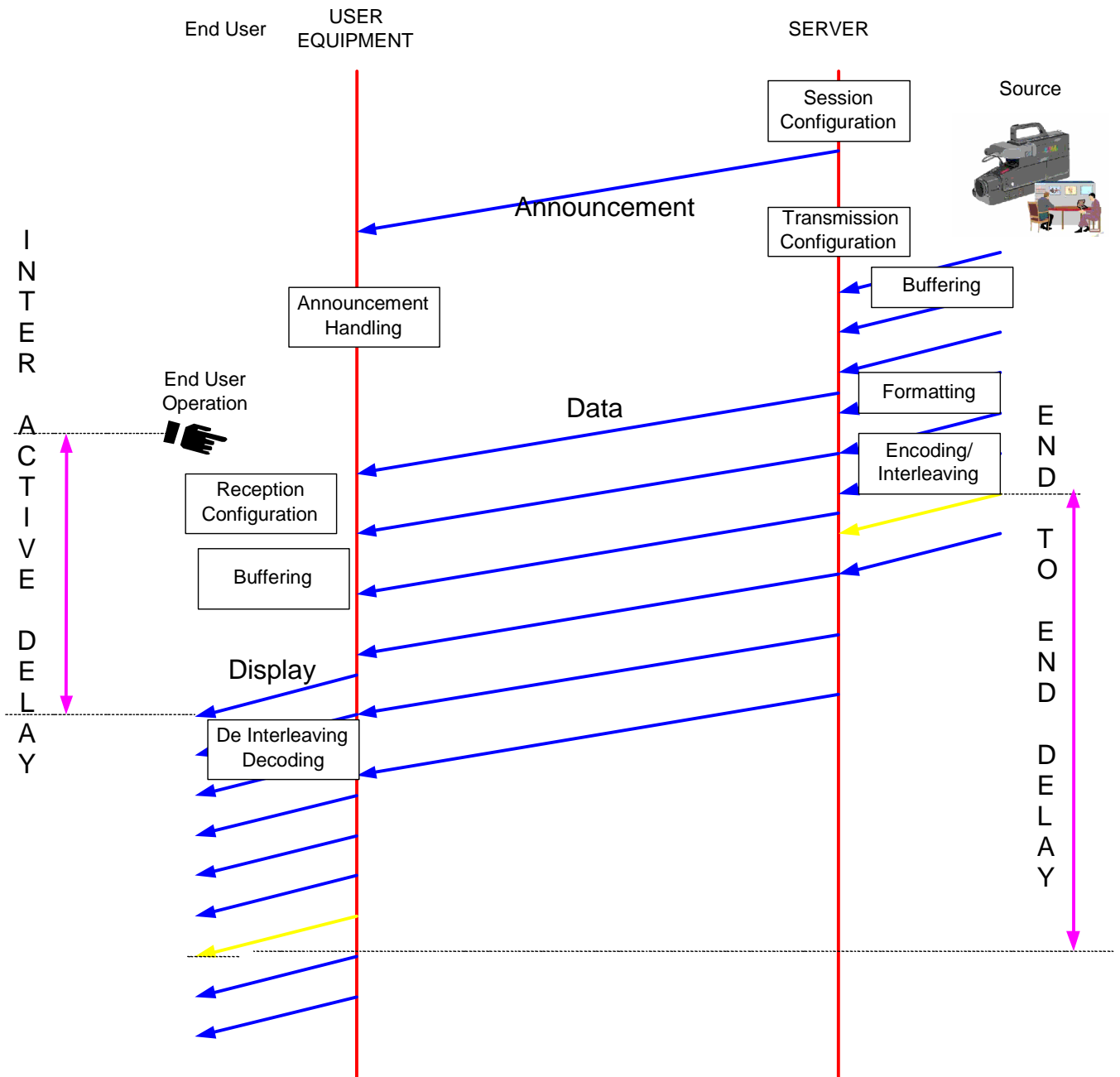


Figure 3: Streaming

5.1.2 File download services

This service delivers binary data (file data) over an S-MBMS bearer. An S-MBMS client (i.e. UE) activates an appropriate application, and utilizes the delivered data. The most important functionality for this service is reliability. In other words, it is necessary that the user receive all the data sent in order to experience the service.

Two different download schemes are depicted, namely Batch (cold) and Urgent (hot) download.

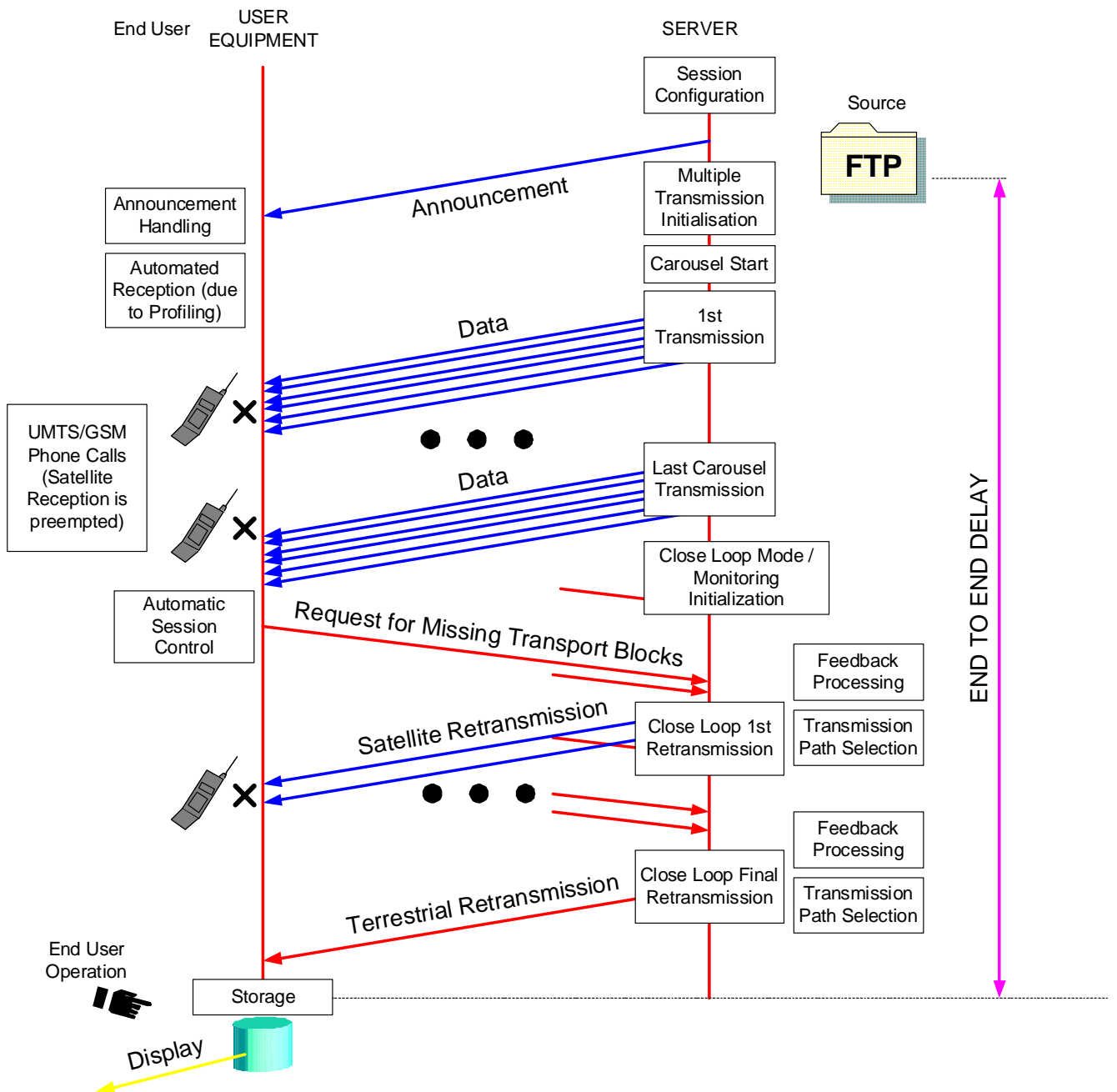


Figure 4: Batch (cold) download procedure sample

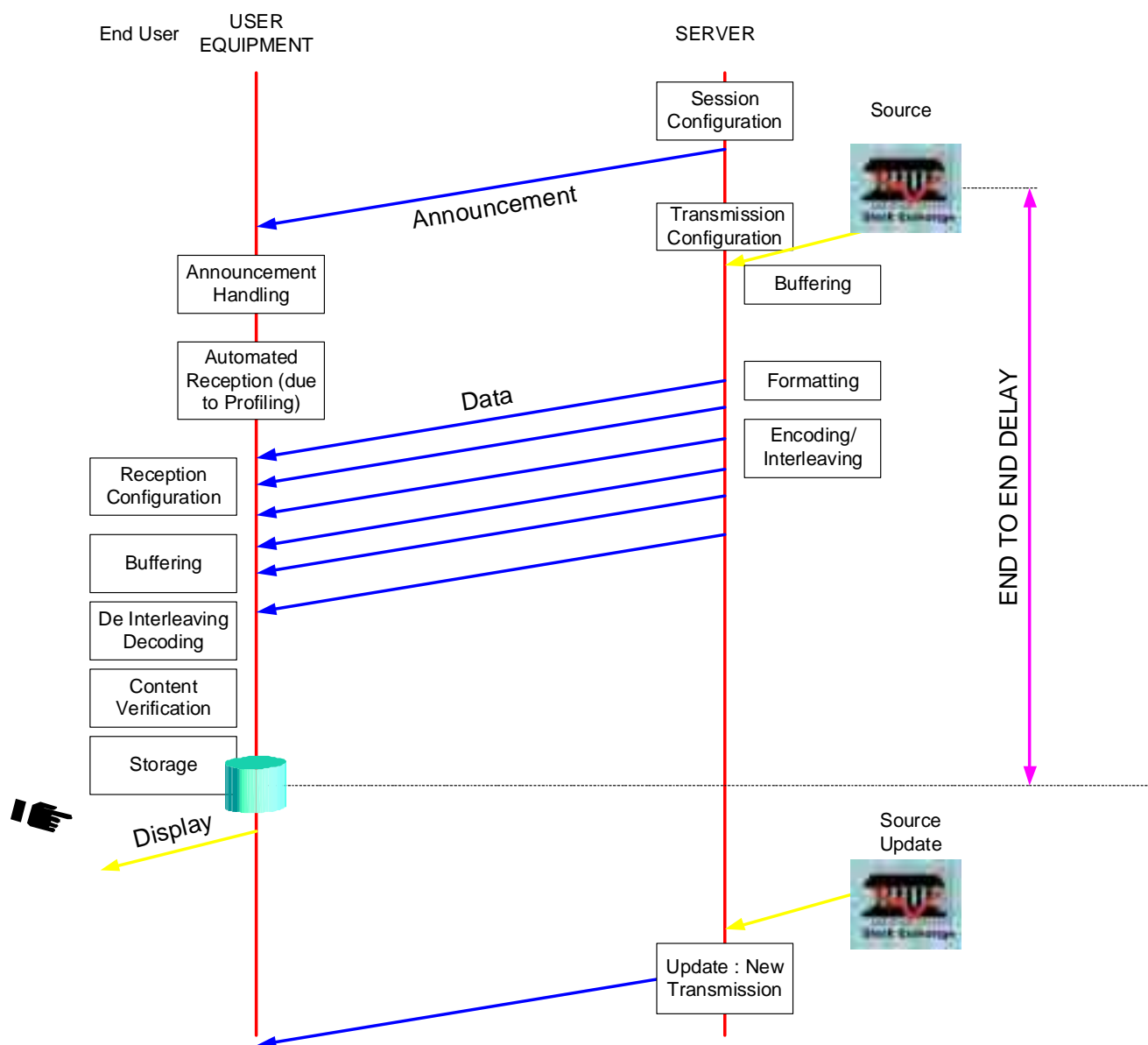


Figure 5: Urgent (hot) download procedure sample

5.1.3 Carousel services

Carousel is a service that combines aspects of both the Streaming and File download services described above. Similar to the streaming service this service includes time synchronization. However, the target media of this service is only static media (e.g. text and/or still images). Time synchronization with other media is also required. For example, text objects are delivered and updated from time to time. Still images may also be collated to display low frame-rate video. In common with the download service this service also includes reliability (typically 100 % reliability is not always necessary). The benefit of this service is that it is possible over a low bit-rate bearer.

An example of an application utilizing the Carousel service is a "ticker-tape" type service in which the data is provided to the user repetitively and updated at certain times to reflect changing circumstances.

6 High level requirements

6.1 Requirements common to Broadcast and multicast modes

The operator may provide S-MBMS services on his own or in collaboration with third party service providers.

The operator may provide services to its home subscriber or to roaming subscribers from other operators.

S-MBMS services shall be bearer agnostic to enable access via generic IP access systems.

It shall be possible for an S-MBMS user service to make use of different application independent S-MBMS transport services at different times or in parallel. The S-MBMS transport services may vary for instance in QoS parameters or target broadcast/multicast areas. If an S-MBMS user service makes use of several application independent S-MBMS transport services then these may only consist of either broadcast or multicast services, but not of a combination of both.

The UE shall be able to monitor and store locally service usage measurements including but not limited to volume of received data, identification of selected contents for further off-line processing.

The operational system shall provide the means to collect service usage measurements from the UE using p-t-p connection and to analyse this data for statistical purposes.

In case of IMRs deployment, IMRs shall be monitored and controlled in a centralized way, by their operator.

The operational system shall be able to monitor the coverage over service area provided by the Space segment.

The QoS parameters shall include traffic type (real time vs background selection), transfer delay characteristics, probability of delivery success, bandwidth and jitter.

The operational system shall allow the end user to activate/de-activate the reception of a subscribed S-MBMS service.

The S-S-MBMS service reception shall not impact operations of UE attached to mobile networks including but not limited to paging, location update, cells monitoring, measurements, calls.

The end user shall be able to access to stored content at any time and without limitation of duration or number of times if he/she is granted corresponding rights by Digital Rights Management (DRM).

In order to improve the reliability of the distribution, the network shall implement a reliable transport function without permanent real time return link (neither satellite nor terrestrial). The reliable transport function comes in addition to physical layer correction mechanisms. It shall include error resilient scheme, e.g. Forward Error Correction, interleaving; the configuration of this error resilient scheme might be function of the delivery method and the kind of services and contents to be carried. The Reliable transport function shall implement a content protection via content repetition (carousel). The Reliable transport function shall be configurable in function of the service type and required QoS, including the likelihood for the correct content reception.

6.2 Broadcast mode

6.2.1 Home Environment requirements

Broadcast services

The PLMN operator shall be able to provision one or more broadcast services within his PLMN.

The operators sharing a network shall be able to provide one or more broadcast services for their own subscribers and inbound roamers from roaming partners only. This shall be applicable for sharing of radio network and for sharing of radio network and the core network entities connected to the radio network.

A broadcast area is configured individually for each broadcast service. Broadcast areas associated with different broadcast services are independent of each other and may overlap.

A broadcast service shall be able to distribute different content data to different locations, i.e. local broadcast areas, within the broadcast service area as shown in figure 6. This allows the user to receive broadcast data depending on his location (e.g. a "nation-wide traffic service" with localized traffic reports in regional spots). Only one location specific version of content data is distributed to each of the individual local broadcast areas, i.e. in any location a user will never receive different content data from a single broadcast service.

It shall be possible to define a broadcast service for only the subscribers and inbound roamers of one of the operators sharing network. The broadcast services transmitted in a broadcast service area of operator A shall only be available to the subscribers and inbound roamers of operator A. The broadcast areas of different sharing operators may cover the same geographical area. This shall be applicable for sharing of radio network and for sharing of radio network and the core network entities connected to the radio network.

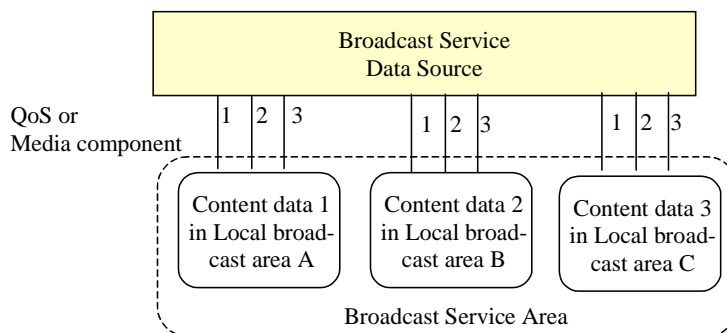


Figure 6: Broadcast Service with different content data for different locations

Quality of service

The PLMN operator shall be able to configure the quality of service for each individual broadcast service. It should be possible to adapt the S-MBMS data transmission to different RAN capabilities or different radio resource availability.

The home environment shall be able to set priority to select which simultaneous broadcast services are supported when there is a limit on the resources available.

Network and radio efficiency

The PLMN operator shall be able to use network and radio resources in an efficient manner.

The operator shall be able to schedule a certain broadcast service at pre-determined times.

Types of data services

S-MBMS in broadcast mode shall be transparent for the transferred data packets independent of the type of service being transmitted, will support a number of services, and permit support of and therefore transfer all data types, e.g. Audio, Data, Video or combinations thereof. A minimum number of data types may need to be identified to enable interoperability.

Sources of data services

In addition to supporting their own broadcast services the PLMN shall as well support broadcast services from third parties (i.e. HE-VASPs or VASPs).

Broadcast service announcements

The PLMN operator shall be able to provide service announcements for a broadcast service within and outside of the broadcast area defined for the service.

6.2.2 User requirements for S-MBMS

User mobility

The user shall be able to continue receiving broadcast services throughout the broadcast service area. For example, in case of handover and presuming that a certain broadcast service is offered in the target satellite spot, it should be possible for the user to continue receiving the service in the target satellite spot.

User selectivity

The user shall be able to discover what broadcast services are available at the user's current location and outside of the current location.

The user shall be able to enable/disable the reception of specific broadcast services and can receive simultaneously more than one S-MBMS service.

The user may be able to define service preference for reception. A priority procedure may be implemented to allow the user to select between simultaneous broadcast services, e.g. while receiving commercial broadcast service a new multicast service may interrupt this.

While receiving one or more broadcast services, it shall be possible for the user to be informed about incoming voice calls or the availability of other S-MBMS services.

Dependent on terminal capabilities, it shall be possible for the user to participate in other services, while simultaneously participating in S-MBMS services. For example, the user can originate or receive a call or send and receive messages whilst receiving advertisements.

6.3 Multicast mode

6.3.1 Home Environment requirements

Multicast services

The PLMN operator shall be able to provision one or more multicast services. A multicast area is configured individually for each multicast service. Multicast areas associated with different multicast services are independent of each other and may overlap.

Multicast service areas may cover part(s) of one or more PLMNs.

A multicast service shall be able to distribute different content data to different locations, i.e. local multicast areas, within the multicast service area as shown in figure 7. This allows the user to receive multicast data depending on his location (e.g. a "nation-wide traffic service" with localized traffic reports). Only one version of location specific content data is distributed to each of the individual local multicast areas, i.e. in any location a user will never receive different content data from a single multicast service.

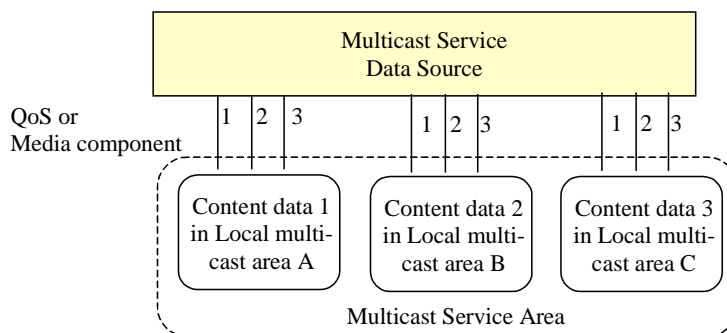


Figure 7: 4 Multicast Services with different content data for different locations

Multicast subscription groups and multicast groups

The PLMN operator shall be able to provision one or more multicast subscription groups. The Home Environment shall be able to make a user a member of a multicast subscription group (subscription).

On receipt of a request to join a multicast group, the PLMN shall check that the user is a member of the applicable multicast subscription group. The Home Environment shall be able to join users to the multicast group, e.g. at the request of the subscriber.

Quality of service

The PLMN operator shall be able to configure the quality of service for individual multicast services. It should be possible to adapt the S-MBMS data transmission to different RAN capabilities or different radio resource availability.

As part of the same service, it should be possible for the operator to provide the UEs with multiple successive sessions with different quality-of-service for each session.

The Home Environment shall be able to set priority to select which simultaneous multicast services are supported when there is a limit on the resources available.

Network and radio efficiency

The PLMN operator shall be able to use network and radio resources in an efficient manner.

Within the multicast service area, the network may distribute the data across the whole multicast service area or parts of the area. The decision to distribute to only parts of the multicast service area may be based on:

- a) multicast group members are present in a given part of the multicast area;
- b) resources are not available in parts of the multicast service area.

The operator shall be able to schedule a certain multicast service at pre-determined times.

Types of services

The multicast mode shall be independent of the type of service being transmitted, will support a number of services and permit support of all data types, e.g. Audio, Data, Video or combinations thereof. A minimum number of data types may need to be identified to enable interoperability.

Sources of services

In addition to supporting their own multicast services the PLMN shall as well support multicast services by third parties (i.e. HE-VASPs or VASPs).

Multicast service announcements

The PLMN operator shall be able to provide service announcements for a multicast service within and outside of the multicast area defined for the service.

6.3.2 User requirements for S-MBMS

User mobility

The user shall be able to continue receiving multicast services throughout the multicast service area in which the service is provided. For example, in case of handover and presuming that a certain multicast service is offered in the target cell, it should be possible for the user to continue the session in the target cell. It is possible that data loss will occur due to user mobility.

User selectivity

The user shall be able to discover what multicast services are available at the user's current location and outside of the current location. The user shall be able to select between different multicast services provided to the user and can receive simultaneously more than one S-MBMS service.

The user may be able to define service preference for reception. A priority procedure may be implemented to allow the user to select between simultaneous broadcast/multicast services, e.g. while receiving commercial broadcast service a new multicast service may interrupt this.

While receiving PS or CS services via USRAN, it shall be possible for the user to receive notification of S-MBMS multicast sessions.

While receiving one or more multicast services it shall be possible for the user to be informed about incoming voice calls or the availability of other S-MBMS services.

Dependent on terminal capabilities, it shall be possible for the user to participate in other services, while simultaneously participating in S-MBMS services. For example, the user can originate or receive a call or send and receive messages whilst receiving S-MBMS video content.

Multicast subscription groups and multicast groups

The subscriber shall be able to subscribe to or unsubscribe from a multicast subscription group.

The user shall be able to join a multicast group only if he is a member of the applicable multicast subscription group. The user shall be able to leave a multicast group if he is a member of that group.

6.4 Availability

S-MBMS in multicast or broadcast mode shall be available to all users that are registered/attached to a PLMN, in case of non-shared network.

In the case of two or more operators sharing infrastructure (e.g. sharing a satellite spot or a satellite hub), it shall be possible for a sharing operator offering S-MBMS in multicast or broadcast mode to prevent access to these S-MBMS services by subscribers and inbound roamers of the other operator(s) sharing the same infrastructure.

Within the broadcast or multicast service area, it shall be possible to inform users of up-coming S-MBMS sessions which they may receive. This may be useful, e.g. to initiate UE processes for the reception of S-MBMS data.

In case of roaming a user should also be able to subscribe and join Multicast Services that are provided locally in the visited network (satellite spot), as allowed by the user's home environment.

6.5 Interoperability

S-MBMS User Services shall ensure service interoperability with respect to media formats and codecs, at the same time being able to re-use existing multimedia capabilities in the UE as far as possible.

Therefore S-MBMS User Services shall support a minimum set of media formats and codecs. This minimum set should be aligned with the set of media formats and codecs required for 3G MMS (see Bibliography) and PSS (see Bibliography).

6.6 Delivery verification

For some S-MBMS User Services it is required that the operator can verify that the content conveyed by the service has been received by the UE.

The UE shall provide a secure means to provide such delivery verification transmitted over a point-to-point connection to the home/visited network. This delivery verification may be relayed to the service provider.

7 Security

In multicast mode it shall be possible to ensure that only those users who are entitled to receive a specific multicast service may do so. It should be possible to choose whether a given multicast service is to be delivered with or without ensured group privacy.

If a terminal supports S-MBMS, then it shall support UICC based key management and all the function and interfaces required for it. In addition, ME key management shall be supported. If the UICC is capable of S-MBMS key management, ME key management shall not be activated.

8 Charging

The S-MBMS User Service shall support the following charging mechanisms:

- Charging on a subscription basis.
- Charging for keys that allow the user access to the data.

8.1 Broadcast mode

It shall be possible to collect charging information for the transmission of broadcast services to enable billing of broadcast services providers, e.g. billing 3rd parties for advertising.

It shall be possible to bill the S-MBMS services delivery based on two types of models: subscription and pay per act.

Examples of the type of the charging information that could be collected include:

- usage duration;
- volume of contents.

The above list of possible charging mechanisms is neither complete nor exhaustive.

It shall be possible to collect subscriber charging information for the end user (including roaming situations) based on security procedures (e.g. key management) for the receipt of broadcast data on a per broadcast service basis.

It shall also be possible to provide free-to-air services, that do not require end-user subscription.

8.2 Multicast mode

It shall be possible to collect charging information for the transmission of multicast services to enable billing of multicast services providers, e.g. billing 3rd parties for advertising.

It shall be possible to collect subscriber charging information (including roaming) for the use of the multicast mode (e.g. to enable billing to multicast services providers), as well as for the receipt of multicast data (e.g. users), on a per multicast service basis. On-line charging for multicast services should be possible as well.

Examples of the type of the charging information that could be collected include:

- multicast session duration;
- time when joining and leaving a multicast subscription group, duration of membership to a multicast subscription group;
- time when joining and leaving a multicast group, duration of membership to a multicast group;
- multicast session volume of contents.

The above list of possible charging mechanisms is neither complete nor exhaustive.

Annex A (informative): Bibliography

- ETSI TS 102 442-2: "Satellite Component of UMTS-IMT 2000; Technical Specification S-UMTS; Multimedia Broadcast/Multicast Services(S-MBMS); Part 2: Architecture and functional description".
- ETSI TS 126 140 : "Multimedia Messaging Service (MMS) : Media formats and Codecs".
- ETSI TS 126 134: "Transparent end-to-end Packet-switched Streaming Service (PSS) : Protocols and codecs".
- ETSI TR 121 905: "Vocabulary for 3GPP specifications".
- ETSI TS 122 146 (Release 6) : "Universal Mobile Telecommunications System (UMTS); Multimedia Broadcast/Multicast Service (MBMS); Stage 1 (3GPP TS 22.146 Release 6)".
- ETSI TS 122 246 (Release 6) : "Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); Multimedia Broadcast/Multicast Service (MBMS) user services; Stage 1 (3GPP TS 22.246 Release 6)".
- ETSI TS 124 002: "Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); GSM-UMTS Public Land Mobile Network (PLMN) Access Reference Configuration (3GPP TS 24.002)".

History

Document history		
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