IST Integrated Project No 507023 – MAESTRO

D6-6.2

Service Centre Specification document
(For R2)

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Abstract:

This document provides the Broadcast Multicast Service Centre (BM-SC) specification. It provides the BM-SC requirements for the commercial SDMB system that have been identified to date (from D6-6.1 – BM-SC Specification for Release 1) and also the requirements that have been identified for the MAESTRO Release 2 Test Bed.

Keyword list: BM-SC specification

EXECUTIVE SUMMARY

This document contains deliverable **D6-6.2** of the IST Integrated Project MAESTRO – Mobile Applications & sErvices based on Satellite and Terrestrial inteRwOrking (IST Integrated Project n° 507023).

MAESTRO project aims at studying technical implementations of innovative mobile satellite systems concepts targeting close integration & interworking with 3G and Beyond 3G mobile terrestrial networks.

MAESTRO aims at specifying & validating the most critical services, features, and functions of satellite system architectures, achieving the highest possible degree of integration with terrestrial infrastructures. It aims not only at assessing the satellite systems' technical and economical feasibility, but also at highlighting their competitive assets on the way they complement terrestrial solutions.

This is the seventh of eight tasks in Work Package 6 – "Architecture".

The deliverable **D6-6.2** – "**Service Centre Specification document**" - describes the BM-SC requirements for the MAESTRO Release 2 Test Bed.

The task is led by LogicaCMG.

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3.2	21 Dec 2004	Final version for delivery.

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1 INTRODUCTION

1.1 Background

This document provides an initial draft of the Broadcast Multicast Service Centre (BM-SC). It provides the BM-SC requirements for the commercial SDMB system that have been identified to date (from D6-6.1 – BM-SC Specification for Release 1) and also the requirements that have been identified for the MAESTRO Release 2 Test Bed.

The 2 key inputs to the Release 2 Test Bed requirements specification are as follows:

- D6-1.2b – Technical Requirement Specification for the Release 2 Test Bed

- D6-2.2b – MAESTRO Release 2 Test Bed Design Document

This specification has been produced by LogicaCMG.

1.2 Fields of application

This document is applicable to the partners involved with designing, developing, integrating, verifying, validating and maintaining the MAESTRO BM-SC platform as specified for the Release 2 Test-Bed system.

2 DOCUMENTARY REFERENCE SYSTEM

This chapter provides a list of all the applicable documents, standards and reference documents that have relate to the production of this technical specification.

2.1 Applicable documents

MAESTRO Contract, Technical annex

2.2 Applicable norms and standards

The following standards are relevant to the definition of this document:

3GPP TS 22.146, Multimedia Broadcast/Multicast Service (MBMS); Stage 1

3GPP TS 22.246, MBMS User Services

3GPP TS 23.246, MBMS Architecture and Functional Description

3GPP TS 25.346, MBMS in the Radio Access Network

3GPP TR 25.992, UTRAN/GERAN requirements

3GPP TS 29.061, PLMN and PDN interworking

3GPP TR 29.846, CN1 procedure description

3GPP TS 33.246, MBMS Security

At the time of writing it is not possible to specify in detail the exact versions of these standards that are applicable as the standardisation process is on-going.

2.3 Reference documents

The following documents that are being defined under the auspices of the MAESTRO project have been referenced in putting this document together:

To be added.

3   TERMS, DEFINITIONS, ABBREVIATED TERMS AND SYMBOLS

Please refer to Tn002.ASP.MAESTRO.V2.2 for a detailed glossary of terms as used within the context of the MAESTRO project.

4   GENERAL PRESENTATION OF THE PRODUCT

This chapter provides a high level overview of the commercial BM-SC product without specifying any detailed formal requirements. The latter are specified in detail in chapter 5.

4.1   Perspectives of the product

The BM-SC is a functional entity that will provide a range of functions related to the provision of the SDMB service. For example, the BM-SC will control user access to services, authorise and initiate bearer services within the SDMB system, and schedule and deliver transmissions over the SDMB system.
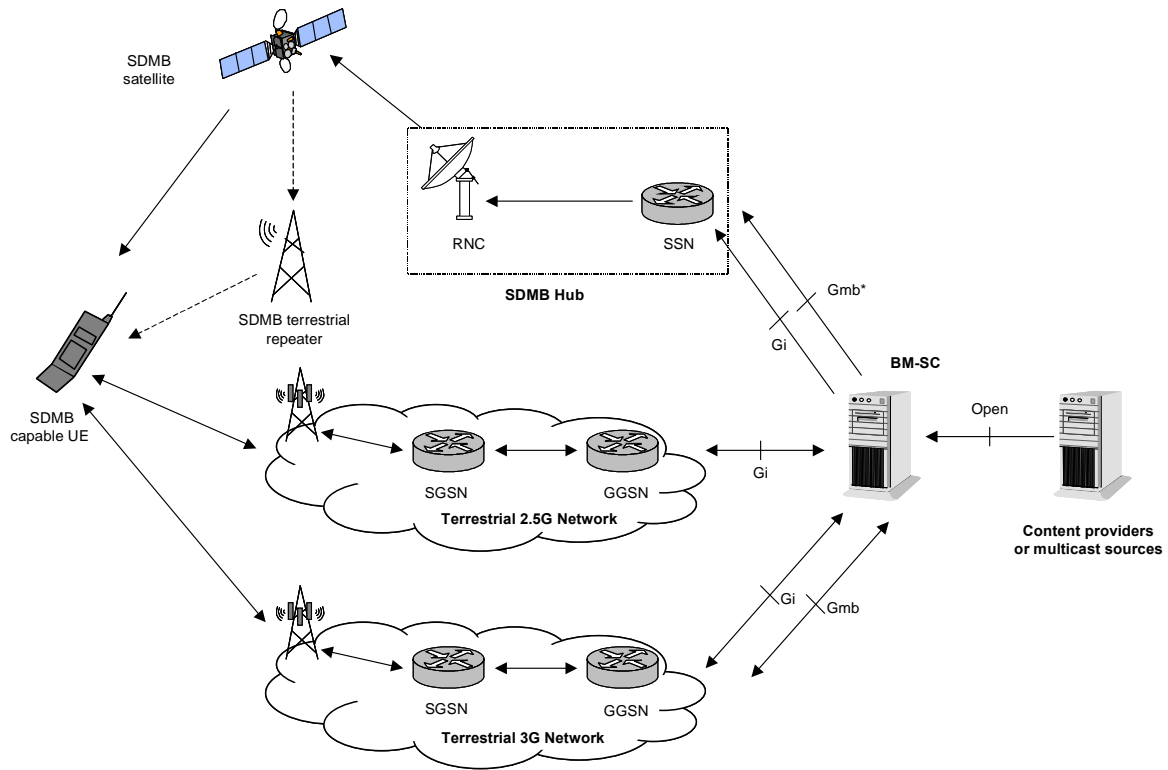
Figure 1: Context of Commercial BM-SC Product.

The context of the BM-SC within the SDMB System is illustrated in the figure above. The figure shows that the BM-SC will support the following interfaces:

- Gmb* – towards the SDMB Hub (SSN) to support signalling exchanges to control the establishment of SDMB services over the SDMB system (ie control plane functions). This interface is denoted with an asterix to highlight the fact that the standard 3GPP Gmb interface will be tailored to suit the particular requirements of the SDMB system. For example, for the SDMB system it will only be necessary to support the MBMS Broadcast Mode as defined in the 3GPP MBMS specifications. The Gmb* interface is also internal to the SDMB system

and therefore is not fully reliant on the completion of the MBMS standardisation process (see below). However, the intention of the MAESTRO project should be to track (and adopt as appropriate) any developments within 3GPP MBMS.

- Gi* – towards the SDMB Hub (SSN) to support delivery of IP multicast datagrams (ie bearer plane) to a specified Quality of Service (QoS).

- Gmb – towards the GGSN in UMTS Release 6 MBMS-capable terrestrial networks to control the establishment of broadcast and/or multicast services over terrestrial networks. It should be noted that the Gmb interface is not currently fully defined by 3GPP.

- Gi – with the GGSN in UMTS Release 6 MBMS-capable terrestrial networks to support the delivery of IP multicast datagrams with a specified QoS.

- Gi – with the GGSN in terrestrial 2.5G / 3G networks to support point-to-point connectivity with the SDMB enabled UE (e.g. to support signalling exchanges for service join, reliable transport etc.).

- Open interface(s) with external Content Providers for the provision of multimedia content for delivery over the SDMB system.

It is worth noting that MBMS standardisation within 3GPP is still in progress with a large number of areas still to be defined and approved. The target date for completion of this standardisation process is now December 2004.

TS 23.246 defines the functional requirements for the BM-SC and the framework provided by this specification is considered sufficiently stable to be suitable for taking forward into SDMB.

The implementation of the BM-SC for SDMB will be based upon LogicaCMG's existing Multicast Service Centre platform enhanced as necessary to meet the requirements defined in this specification.

5   COMMERCIAL PRODUCT REQUIREMENTS

This section addresses the requirements of the commercial BM-SC product, and draws upon the existing 3GPP MBMS specifications as well as a number of documents currently being generated within the MAESTRO project (see section 2.3).

5.1   External Interface requirements

BM-SC.C.REQ.01.   The BM-SC shall support the Gmb* signalling plane interface with the SDMB Hub to control the establishment (session start and session stop) of broadcast bearers over the SDMB system. This includes the means to:

- specify bearer-level QoS requirements.

- specify the geographic service area.

The MBMS Architectural and Functional Description TS 23.246, defines the following procedures to control establishment of MBMS bearer contexts within the CN and RAN:

- **Session Start** (Section 8.3 of TS 23.246) – ie a request to activate all necessary resources in the network for the transfer of IP multicast traffic and to notify UEs of imminent start of the transmission.
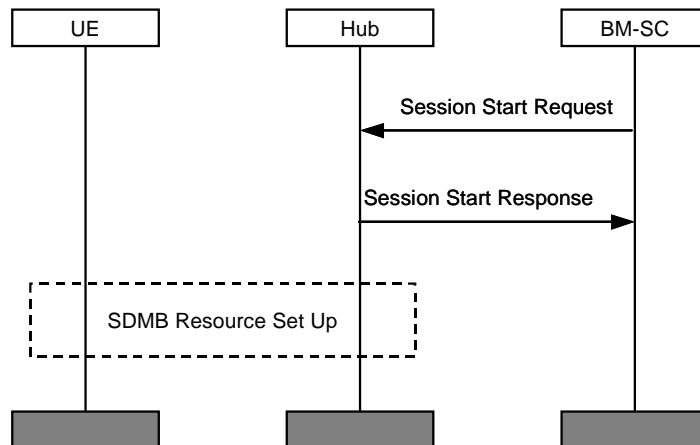
At Session Start the BM-SC needs to define the characteristics of the bearer context to be set up. These have not been defined in detail by 3GPP; the following are possible:

- Bearer identifier (eg TMGI defined by 3GPP)

- Session identifier (if separate id required)

- IP multicast address

- Source address (if Source Specific Multicast)

- Quality of Service parameters

- Service Area (probably related to a set of SDMB spot beams)

- Expected duration of service

- **Session Stop** (Section 8.5 of TS 23.246) – ie a request to release resources where there is no more IP multicast traffic expected for a sufficiently long period (or at end of service) to justify a release of user plane resources in the network.

```
    UE              Hub             BM-SC

                           Session Stop Request
                     <────────────────────────

                     Session Stop Response
                     ────────────────────────>

     ┌ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ┐
     │ SDMB Resource Release │
     └ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ┘
```
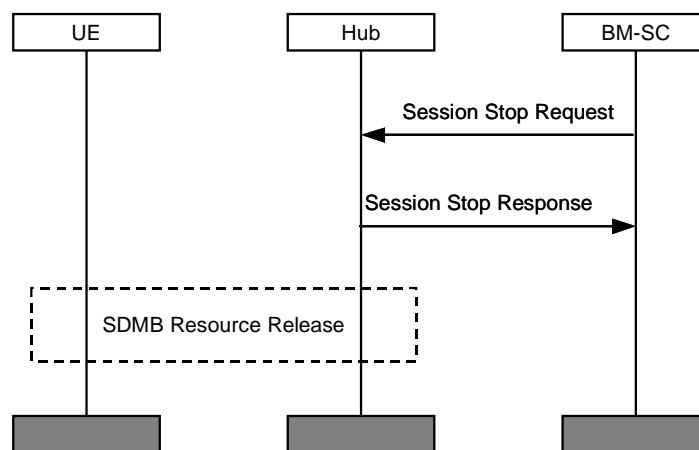
The protocol to be used to carry the bearer control signalling has yet to be defined. It is anticipated that an IP-based signalling protocol will be used, either defined by 3GPP or adapted from an IETF standard. Because the full MBMS Gmb interface has a number of AAA requirements, use of IETF AAA signalling protocols is being considered. 3GPP are currently proposing the use of DIAMETER (RFC 3588) although it is considered that RADIUS (RFC 2865) is equally applicable in this context.

Bearer management
processes

```
        ┌──────────────────────┐            ┌──────────────────────┐
        │  DIAMETER / RADIUS   │            │  DIAMETER / RADIUS   │
        ├──────────────────────┤            ├──────────────────────┤
        │      TCP / UDP       │            │      TCP / UDP       │
        ├──────────────────────┤            ├──────────────────────┤
        │      IP / IP-Sec     │            │      IP / IP-Sec     │
        ├──────────────────────┤            ├──────────────────────┤
        │          L2          │            │          L2          │
        ├──────────────────────┤            ├──────────────────────┤
        │         Phy          │            │         Phy          │
        └──────────────────────┘            └──────────────────────┘
```

Gmb*

Hub   **BM-SC**
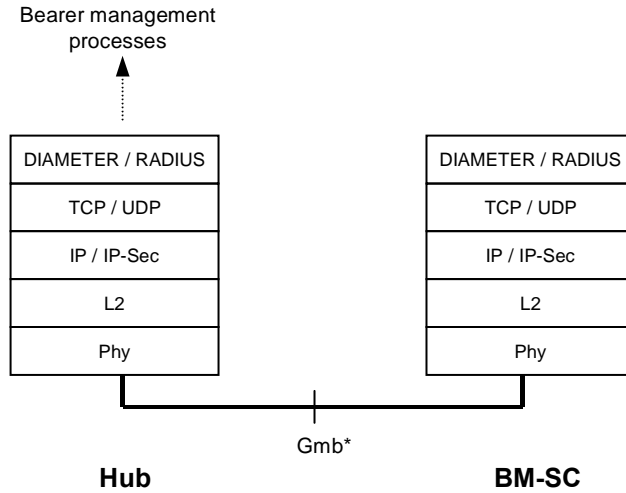
Figure 2: Gmb* bearer control signalling plane (example)

BM-SC.C.REQ.02. The BM-SC shall support the Gi* interface with the SDMB Hub which may be required to perform the following fuctions:

- **Service annoucements:** To inform the end user of forth-coming services (TBC if to be supported over SDMB or terrestrial network or both).

- **Broadcast Transmission:** User plane interface to support the transmission of IP multicast traffic from the BM-SC to the SDMB Hub and on to the SDMB enabled UE.

It is expected that the User Plane interface to have the architecture shown below.

Higher layers
(peered with UE)

```
        ┌──────────────┬──────────────┐       ┌──────────────┐
        │      IP      │      IP      │       │      IP      │
        ├──────────────┼──────────────┤       ├──────────────┤
        │     PDCP     │      L2      │       │      L2      │
        │              ├──────────────┤       ├──────────────┤
        │              │     Phy      │       │     Phy      │
        └──────────────┴──────────────┘       └──────────────┘
```

SDMB
Network

Gi*

Hub   **BM-SC**
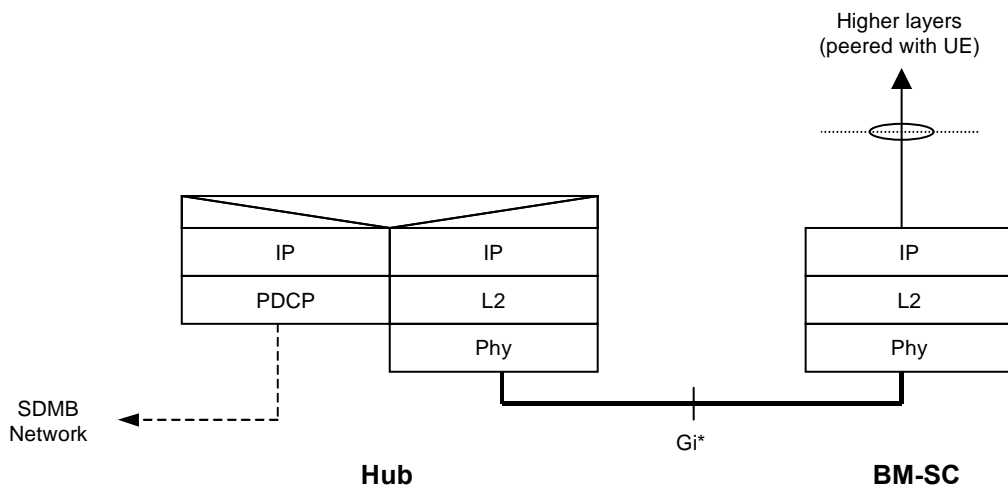
Figure 3: Gi* User Plane

It is worth noting that between the BM-SC and the UE the following mechanisms may be applied:

- Security mechanisms (ie encryption)

- Reliable transport mechanisms

Because these mechanisms will be applied end-to-end, the Hub should treat these transparently. It is therefore recommended that the Hub should simply act as an IP multicast router and not have any higher layer functionality.

A number of User Plane control mechanisms are also required in order to support the multicast service:

- **Multicast routing**: Unless some simple packet forwarding mechanism is employed between the BM-SC and Hub, it is assumed that the Hub will need to join/leave the multicast group by sending routing messages upstream towards the source. Depending on the architecture this may be achieved using the host-router protocol IGMP, but more likely will be served by an inter-network routing protocol such as PIM-SM. This is for further study in WP4.

  It will also be necessary when accessing through a multicast backbone to specify Source Specific Multicast (SSM) on the Gi interface in order to ensure that only traffic from the defined source will be injected into the SDMB system.

- **QoS control**: The network bearer between the BM-SC and the Hub may need to be configured to support a particular QoS, matched to the Quality of Service specified in the Bearer Control messages for setting up the radio bearer across the SDMB system. Suitable mechanisms for establishing QoS depend on the means by which the BM-SC and Hub are to be interconnected but may need to rely on pt-pt QoS mechanisms such as RSVP, DiffServ/MPLS, or IP over ATM.

  Traffic will also need to be adequately policed at the Hub to ensure that several streams injected from different SDMB service providers are transmitted over the SDMB radio bearer to the requested Quality of Service.

BM-SC.C.REQ.03. The BM-SC shall support the 3GPP Gmb interface with UMTS Release 6 MBMS-capable terrestrial networks.

BM-SC.C.REQ.04. The BM-SC may be required to support the Gi interface with UMTS Release 6 MBMS-capable terrestrial networks to support the delivery of multicast and/or broadcast bearer transmissions to SDMB enabled UEs.

BM-SC.C.REQ.05. The BM-SC shall support a unicast point-to-point connection with the UE via the Gi interface in order to support some or all of the following functions:

- Signalling with the UE (e.g. session management, security management)

- Return channel for reliable transport layer

- Point-to-point transmissions to particular mobiles, either

- following transmission failure over SDMB (tbc), or

- to transmit to mobiles outside SDMB coverage (tbc), or

- to transmit to mobiles based on other criteria (tbc)

- Feed into SDMB service from mobile (eg 'groupcast' service)

It is noted in the above that the scalability of this link will be a key issue in the context of the SDMB system.

BM-SC.C.REQ.06. The BM-SC shall support interfaces (multicast, unicast or other) with external Content Providers (exact nature of interfaces tbd) to source multimedia content for delivery over the SDMB system.

5.2   Operational requirements

5.2.1 Operational scenarios

The BM-SC data model and associated operation is summarised in this section. Where possible, comments are made as to the mapping from this model to the SDMB system context (ie SDMB role mobel)..

The data model consists of the following entities:

- **Users** – who have different priviledges to interact with the BM-SC depending upon their status as follows:

  - Standard Users – the majority of Users are Standard Users who do not have any rights to alter the configuration of the BM-SC in any way.

  - User Community Adminstrators – these Users have the right to control the status of Standard Users within the same User Community.

  - Root Users – who are the master Users for the system as a whole and who have (for example) the right to control the status of both User Communitiy Administrators and Standard Users.

  In the context of the SDMB system role model, if it is assumed that the SDMB Operator hosts the BM-SC on behalf of a number of Mobile Network Operators, the Root User would map to the SDMB Operator, the User Communitiy Administrator would map to the Mobile Network Operator and the Standard User would map to the End User.

- **User Community** – all Users belong to a User Community. For example, a User Community may be a corporate organisation, with the Users being employees of that organisation. Each User Community subscribes via the BM-SC to receive a number of the available channels.

  Continuing the above mapping to the SDMB context, a User Community would map to a particular Mobile Network Operator.

- **Services** – these represent the multimedia services that are delivered by the BM-SC. These may be data, audio, video etc.

  In the context of the SDMB system, these services map to SDMB services.

- **Bearer Services** – these represent the bearer services (e.g. satellite bearers) that will support the tranport of multimedia services over the SDMB / MBMS network. Depending primarily upon the quality of service associated with the particular multimedia services, each bearer service may be required to provide transport for one or more multimedia services.

Root Users can administer all Users, User Communities, Services and Bearer Services and, in particular, are able to perform the following functions:

- Assign Users to User Communities (each User Community must have at least one User)

- Assign Services to User Community

- Assign a User within a User Community to be the User Community Administrator.

The User Community Administrator is the administrator for a User Community and is able to see and control access to only those Services that have been allocated to that User Community. They will also be able to add Standard Users to the User Community and promote Users within the User Community to the level of User Community Administrator.

The figure below illustrates the operations that can be performed by the different catagories of User defined above. These operations are described in more detail in the following sub-sections.
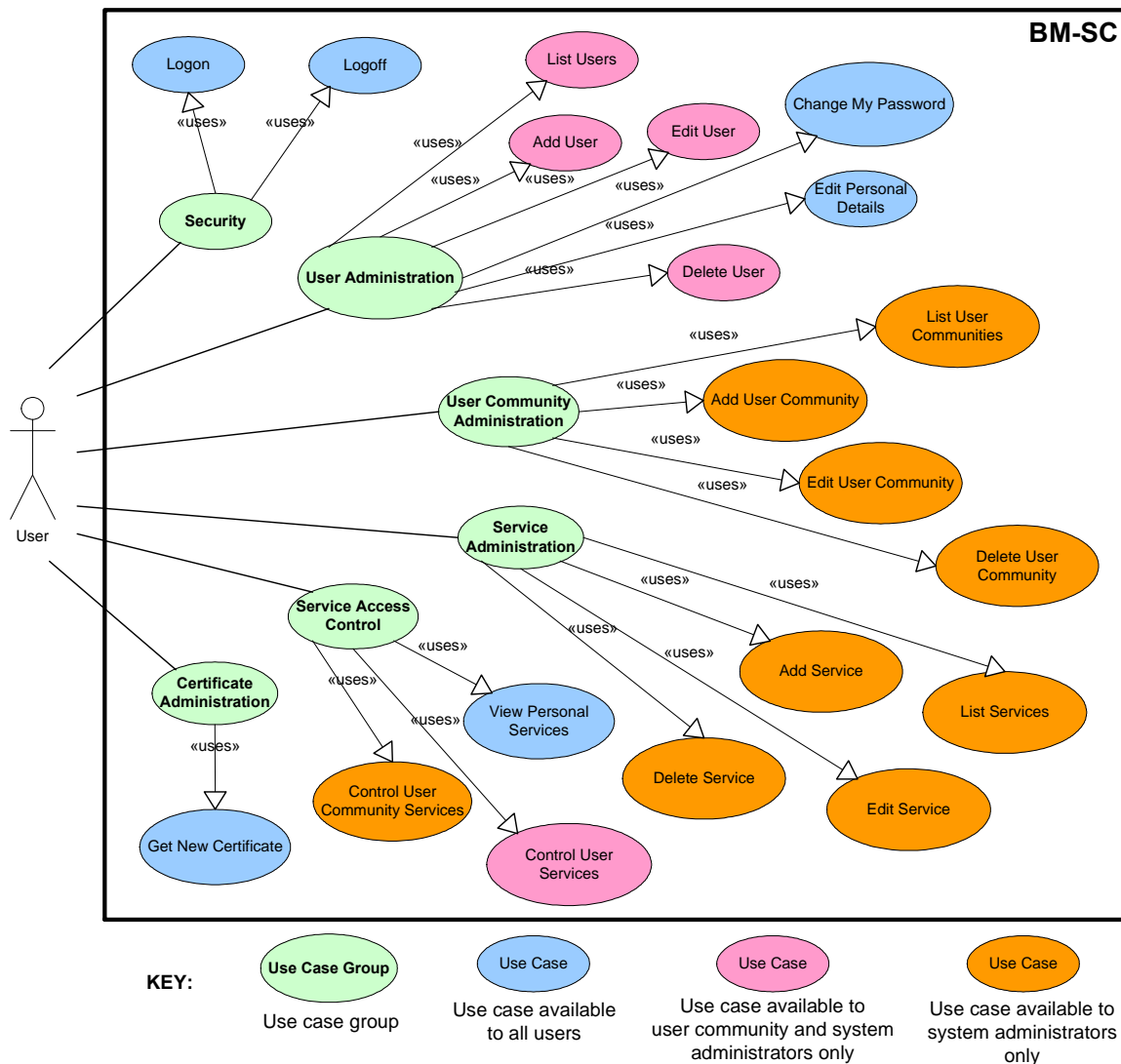
Figure 4: Operational Use Cases Supported by the BM-SC.

5.2.1.1 Standard User Operations

The Standard User has access to the Use Cases shown in blue in Figure 4. He has no privileges other than to view and edit their personal details, check what services they have been given access to, and to change the password they use to log onto the system via the web interface.

Note that within the context of the SDMB system, it is unlikely that the Standard User (or End User) will be allowed to interact directly with the BM-SC to view their personal details in this way.

5.2.1.2 User Community Administrator Operations

The Use Cases available to the User Community Adminstrator include all those available to the Standard User (shown in blue) but in addition now also include those shown in pink.

In summary, the User Community Adminstrator is able to manage other Standard Users within the same User Community. In this way devolved management of User Communities is possible thereby offering the opportunity to lighten the load on the Root User and increase the autonomy of the User Community. The User Community Administrator has the same privileges as the Standard User (ie the ability to check their own status as the Standard User) but in addition they have the ability to:

- Add Standard Users to the User Community,

- Promote a Standard User to a User Community Administrator for that group

- Edit Standard User details and privileges (eg what channels they have access to).

5.2.1.3 Root User Operations

The Use Cases availble to the Root User (or System Administrator) include all of those available to the User Community Administrator, but also include those shown in orange in Figure 4. As this figure illustrates, the Root User has the ability to:

- Add / create User Communities

- Add Services

- Assign Services to User Communities

- Edit User, Services and User Community data.

5.3   **Functional requirements**

5.3.1   Content Provider Authentication, Authorisation and Charging

BM-SC.C.REQ.07. The BM-SC shall be able to authenticate 3rd party content pro-viders that provide content for SDMB transmissions.

BM-SC.C.REQ.08. The BM-SC shall be able to verify the integrity of data received from content providers.

BM-SC.C.REQ.09. The BM-SC shall be able to generate accounting records for content provider transmitted data.

5.3.2   SDMB Transport

BM-SC.C.REQ.10. The BM-SC shall be able to provide the SDMB Hub with transport associated parameters such as bearer-level QoS and the SDMB service area.

BM-SC.C.REQ.11. The BM-SC shall be able to initiate and terminate SDMB bearer resources prior to and following transmission of SDMB data.

5.3.3 SDMB Transmissions

BM-SC.C.REQ.12. The BM-SC shall be able to accept content from external sources and transmit it using error resilient schemes at the transport layer (ie layer 4). Details of these schemes are under study within WP5.

BM-SC.C.REQ.13. The BM-SC shall be able to schedule SDMB service transmissions (and re-transmissions) according to a pre-defined schedule.

BM-SC.C.REQ.14. The BM-SC shall be able to route SDMB services either via the SDMB System or via terrestrial UMTS Release 6 MBMS-capable mobile networks according to a defined routing policy.

5.3.4 Service Announcements

BM-SC.C.REQ.15. The BM-SC shall be able to provide service announcements for SDMB services providing details of how the end user should access the service (detailed mechanisms are for further study).

5.3.5 SDMB Service Delivery

BM-SC.C.REQ.16. The BM-SC shall be able to define geographical areas and associate these with particular SDMB services. (Geographic areas likely to be based upon spot beam coverages – for further study).

BM-SC.C.REQ.17. The BM-SC shall be able to define the end-to-end QoS requirements for each SDMB service.

BM-SC.C.REQ.18. The BM-SC shall be able to associate bearer-level QoS requirements with each end-to-end SDMB service.

BM-SC.C.REQ.19. The BM-SC shall be able to derive the bearer-level QoS requirements in accordance with a service level agreement (SLA) with an external service provider.

BM-SC.C.REQ.20. The BM-SC shall be able to support the following IP-based multimedia content formats:

- Audio

- Video

- Data

BM-SC.C.REQ.21. The BM-SC shall support the following proposed SDMB services:

- Streaming

- Download

- Groupcast

NB Detailed definitions of these services for the commercial system are for further study within the MAESTRO project.

BM-SC.C.REQ.22. The BM-SC shall support MBMS Broadcast Mode (as defined in the 3GPP MBMS standards) towards the SDMB Hub.

BM-SC.C.REQ.23. The BM-SC may be required to support MBMS Broadcast and Multicast Modes towards terrestrial MBMS-capable mobile networks.

5.3.6 End-User Subscription Requirements

BM-SC.C.REQ.24. The BM-SC shall allow an end user to subscribe or un-subscribe to one or more SDMB services.

BM-SC.C.REQ.25. The BM-SC shall be able to store subscription details for each end user.

5.3.7 Accounting Requirements

BM-SC.C.REQ.26. The BM-SC shall be able to generate accounting records for use in billing end users for reception of each SDMB service based upon:

- The duration of the activated SDMB service

- The volume of data transmitted.

5.3.8 Security Functions

BM-SC.C.REQ.27. The BM-SC may be required to authenticate the end user before allowing access to SDMB services.

BM-SC.C.REQ.28. The BM-SC shall be able to authorise access to SDMB services based upon the end user's subscription profile (Details TBC).

BM-SC.C.REQ.29. The BM-SC may be required to authorise access to SDMB services based upon the geographical location of the UE (for further study).

BM-SC.C.REQ.30. The BM-SC shall support end-to-end encryption and associated key management mechanisms to ensure that only authorised users can access the SDMB service. (Specific security algorithms for SDMB are TBC).

5.4   Performance requirements

BM-SC.C.REQ.31. The BM-SC shall be able to support one or more SDMB services simultaneously.

5.5   Applicability of the Commercial Requirements to Test Bed R2

The aim of this section is to review each Commercial Product requirements defined in this chapter and to indicate its applicability to the test bed R2. In the table below the following conventions apply.

- A stands for "fully Applicable",

- PA stands for "Partially Applicable",

- NA stands for "Not Applicable",

PUID	Section	Requirements Specification	MAE TBR2 App.	Comments
	5	**Commercial Product Requirements**		
	5.1	**External Interface requirements**		
BM-SC.C.REQ.01		The BM-SC shall support the Gmb* signalling plane interface with the SDMB Hub to control the establishment (session start and session stop) of broadcast bearers over the SDMB system.	A	To a level consistent with the scope of TBR2
BM-SC.C.REQ.02		The BM-SC shall support the Gi interface with the SDMB Hub.	A	To a level consistent with the scope of TBR2
BM-SC.C.REQ.03		The BM-SC shall support the 3GPP Gmb interface with UMTS Release 6 MBMS-capable terrestrial networks.	NA	
BM-SC.C.REQ.04		The BM-SC may be required to support the Gi interface with UMTS Release 6 MBMS-capable terrestrial networks to sup-port the delivery of multicast and/or broadcast bearer transmissions to SDMB enabled UEs.	NA	
BM-SC.C.REQ.05		The BM-SC shall support a unicast point-to-point connection with the UE via the Gi interface.	A	Local LAN connection for lab test bed; GPRS connection for field test bed
BM-SC.C.REQ.06		The BM-SC shall support interfaces (multicast, unicast or other) with external Content Providers (exact nature of interfaces tbd) to source multimedia content for delivery over the SDMB system.	PA	Local LAN connection only for TBR2
	5.3	**Functional Requirements**		
	5.3.2	**Content Provider Authentication, Authorisation and Charging**		
BM-SC.C.REQ.07		The BM-SC shall be able to authenticate 3rd party content providers that provide content for SDMB transmissions.	NA	Out of scope of TBR2
BM-SC.C.REQ.08		The BM-SC shall be able to verify the integrity of data received from content providers.	NA	Out of scope of TBR2

PUID	Section	Requirements Specification	MAE TBR2 App.	Comments
BM-SC.C.REQ.09		The BM-SC shall be able to generate accounting records for content provider transmitted data.	NA	Out of scope of TBR2
	5.3.3	**SDMB Transport**		
BM-SC.C.REQ.10		The BM-SC shall be able to provide the SDMB Hub with transport associated parameters such as bearer-level QoS and the SDMB service area.	A	Parameters to be supported for further study in TBR2
BM-SC.C.REQ.11		The BM-SC shall be able to initiate and terminate SDMB bearer resources prior to and following transmission of SDMB data.	A	Session start and stop transactions to be supported in TBR2
	5.3.4	**SDMB Transmissions**		
BM-SC.C.REQ.12		The BM-SC shall be able to accept content from external sources and transmit it using error resilient schemes at the transport layer (ie layer 4).	PA	Reliable transport to be provided by UDPush Server. Content will be sourced locally (streaming server or UDPush).
BM-SC.C.REQ.13		The BM-SC shall be able to schedule SDMB service transmissions (and re-transmissions) according to a pre-defined schedule.	PA	The UDCast RMT server will be able to schedule transfers and re-transmissions
BM-SC.C.REQ.14		The BM-SC shall be able to route SDMB services either via the SDMB System or via terrestrial UMTS Release 6 MBMS-capable mobile networks according to a defined routing policy.	PA	Broadcast / multicast services will be transmitted via the Hub only in TBR2. Retransmissions will be sent point-point over the interactive return link by the UDCast RMT server for selective re-transmission.
	5.3.5	**Service Announcements**		
BM-SC.C.REQ.15		The BM-SC shall be able to provide service announcements for SDMB services providing details of how the end user should access the service.	A	The RMT server will send service announcement messages before, during and after the transmission so that the TE is able to know how to retrieve the content
	5.3.6	**SDMB Service Delivery**		
BM-SC.C.REQ.16		The BM-SC shall be able to define geographical areas and associate these with particular SDMB services.	NA	Not required for TBR2
BM-SC.C.REQ.17		The BM-SC shall be able to define the end-to-end QoS requirements for each SDMB service.	A	Service QoS params for TBR2 TBC

PUID	Section	Requirements Specification	MAE TBR2 App.	Comments
BM-SC.C.REQ.18		The BM-SC shall be able to associate bearer-level QoS re-quirements with each end-to-end SDMB service.	PA	Bearer Service QoS params for TBR2 TBC
BM-SC.C.REQ.19		The BM-SC shall be able to derive the bearer-level QoS re-quirements in ac-cordance with a service level agreement (SLA) with an external service provider.	PA	The UDCast RMT server will implement per session QoS based upon a pre-configured SLA.
BM-SC.C.REQ.20		The BM-SC shall be able to support the following IP-based multimedia content formats: · Audio · Video · Data	A	The UDCast RMT server will encode the content data (video, audio, data) and transmit IP multicast packets to the BM-SC which will then encrypt them before routing them to the Hub.
BM-SC.C.REQ.21		The BM-SC shall support the following proposed SDMB services: · Streaming · Download · Groupcast	PA	The UDCast RMT server will implement transport layer func-tions and application layer functions for file download and stream-ing services only.
BM-SC.C.REQ.22		The BM-SC shall support MBMS Broad-cast Mode (as defined in the 3GPP MBMS standards) towards the SDMB Hub.	PA	The BM-SC shall route multicast packets to-wards the Hub only.
BM-SC.C.REQ.23		The BM-SC may be required to support MBMS Broadcast and Multicast Modes towards terrestrial MBMS-capable mo-bile networks.	NA	Not required for TBR2
	5.3.7	**End-User Subscription Requirements**		
BM-SC.C.REQ.24		The BM-SC shall allow an end user to subscribe or un-subscribe to one or more SDMB services.	A	TBR2 end user sub-scriptions will be man-aged in the BM-SC. Mechanisms will be supported to allow the end user to request access to a particular service.
BM-SC.C.REQ.25		The BM-SC shall be able to store sub-scription details for each end user.	A	TBR2 end user sub-scription data will be provisioned into the BM-SC database via a web front end and stored in the database.
	5.3.8	**Accounting Requirements**		

PUID	Section	Requirements Specification	MAE TBR2 App.	Comments
BM-SC.C.REQ.26		The BM-SC shall be able to generate accounting records for use in billing end users for reception of each SDMB service based upon: - The duration of the activated SDMB service - The volume of data transmitted.	NA	Not required for TBR2
	5.3.9	**Security Functions**		
BM-SC.C.REQ.27		The BM-SC may be required to authen-ticate the end user be-fore allowing access to SDMB services (for further study in WP4).	A	TBR2 end users will be authenticated using PKI certificates.
BM-SC.C.REQ.28		The BM-SC shall be able to authorise access to SDMB services based upon the end user's subscription profile.	A	
BM-SC.C.REQ.29		The BM-SC may be required to author-ise access to SDMB services based upon the geographical location of the UE (for further study).	NA	Not required for TBR2
BM-SC.C.REQ.30		The BM-SC shall support end-to-end encryption and associated key man-agement mechanisms to ensure that only authorised users can access the SDMB service.	PA	Existing encryption and key management ca-pability of LogicaCMG plaftorm will be used for TBR2.
	5.4	**Performance requirements**		
BM-SC.C.REQ.31		The BM-SC shall be able to support one or more SDMB services simultaneously.	A	

6 TEST BED R2 REQUIREMENTS

6.1 Traceability of Product Requirements to Specific TBR2 Requirements

This section summarizes all of the Commercial BM-SC Product requirements that are either "fully **A**pplicable" or "**P**artially **A**pplicable" in the section 5.5 and associates them with the specific Test Bed R2 BM-SC Requirement that will satisfy them.

Requirement ID	N°	Applicable Commercial Product Requirement	App	MAE TBR2 Justification	TBR2 Specific Requirement
	5	**Commercial Product Requirements**			
	5.1	**External Interface requirements**			
BM-SC.C.REQ.01		The BM-SC shall support the Gmb* signalling plane interface with the SDMB Hub to control the establishment (session start and session stop) of broadcast bearers over the SDMB system.	PA	To a level consistent with the scope of TBR2	BMSC.TB.REQ.03
BM-SC.C.REQ.02		The BM-SC shall support the Gi* interface with the SDMB Hub.	PA	To a level consistent with the scope of TBR2	BMSC.TB.REQ.01
BM-SC.C.REQ.05		The BM-SC shall support a unicast point-to-point connection with the UE via the Gi* interface.	A	Local LAN connection for lab test bed; GPRS connection for field test bed	BMSC.TB.REQ.01
BM-SC.C.REQ.06		The BM-SC shall support interfaces (multicast, unicast or other) with external Content Providers (exact nature of inter-faces tbd) to source multimedia content for delivery over the SDMB system.	PA	Local LAN connection only for TBR2	BMSC.TB.REQ.01 UDC.TB.REQ.01
	5.3.3	**SDMB Transport**			
BM-SC.C.REQ.10		The BM-SC shall be able to provide the SDMB Hub with transport associated parameters such as bearer-level QoS and the SDMB service area.	PA	Parameters to be supported for further study in TBR2	BMSC.TB.REQ.03 BMSC.TB.REQ.04 UDC.TB.REQ.03
BM-SC.C.REQ.11		The BM-SC shall be able to initiate and terminate SDMB bearer resources prior to and following transmission of SDMB data.	A	Session start and stop transactions to be supported in TBR2	BMSC.TB.REQ.05 UDC.TB.REQ.04
	5.3.4	**SDMB Transmissions**			

Requirement ID	N°	Applicable Commercial Product Requirement	App	MAE TBR2 Justification	TBR2 Specific Requirement
BM-SC.C.REQ.12		The BM-SC shall be able to accept content from external sources and transmit it using error resilient schemes at the transport layer (ie layer 4).	PA	Reliable transport to be provided by UDCast RMT server. Content will be sourced locally (streaming server or UD-Push).	UDC.TB.REQ.01
	5.3.5	**Service Announcements**			
BM-SC.C.REQ.15		The BM-SC shall be able to provide service announcements for SDMB services providing details of how the end user should access the service.	A	The RMT server will send service announcement messages before, during and after the transmission so that the TE is able to know how to retrieve the content.	BMSC.TB.REQ.11 UDC.TB.REQ.04
	5.3.6	**SDMB Service Delivery**			
BM-SC.C.REQ.17		The BM-SC shall be able to define the end-to-end QoS requirements for each SDMB service.	PA	Service QoS params for TBR2 TBC	BMSC.TB.REQ.08 UDC.TB.REQ.04
BM-SC.C.REQ.18		The BM-SC shall be able to associate bearer-level QoS re-quirements with each end-to-end SDMB service.	PA	Bearer Service QoS params for TBR2 TBC	BMSC.TB.REQ.08
BM-SC.C.REQ.20		The BM-SC shall be able to support the following IP-based multimedia content formats: · Audio · Video · Data	A	BM-SC shall accept multicast packets from UDCast RMT server and encrypt them before routing them to the Hub.	BMSC.TB.REQ.13 UDC.TB.REQ.07
BM-SC.C.REQ.21		The BM-SC shall support the following proposed SDMB services: · Streaming · Download · Groupcast	PA	Streaming and file download only for TBR2	BMSC.TB.REQ.12 BMSC.TB.REQ.13 UDC.TB.REQ.08
BM-SC.C.REQ.22		The BM-SC shall support MBMS Broadcast Mode (as defined in the 3GPP MBMS standards) towards the SDMB Hub.	PA	The BM-SC shall route multicast packets towards the Hub only.	BMSC.TB.REQ.14
	5.3.7	**End-User Subscription Requirements**			

Requirement ID	N°	Applicable Commercial Product Requirement	App	MAE TBR2 Justi-fication	TBR2 Specific Requirement
BM-SC.C.REQ.24		The BM-SC shall allow an end user to subscribe or un-subscribe to one or more SDMB services.	A	TBR2 end user subscriptions will be managed in the BM-SC. Mechanisms will be supported to allow the end user to request access to a par-ticular service.	BMSC.TB.REQ.08 BMSC.TB.REQ.09
BM-SC.C.REQ.25		The BM-SC shall be able to store subscription details for each end user.	A	TBR2 end user subscription data will be provi-sioned into the BM-SC database via a web front end and stored in the database.	BMSC.TB.REQ.08
	5.3.9	**Security Functions**			
BM-SC.C.REQ.27		The BM-SC may be required to au-thenticate the end user before allowing access to SDMB services (for further study in WP4).	A	For TBR2, end user will be au-thenticated using PKI certificates.	BMSC.TB.REQ.06
BM-SC.C.REQ.28		The BM-SC shall be able to authorise access to SDMB services based upon the end user's subscription profile.	A		BMSC.TB.REQ.10
BM-SC.C.REQ.30		The BM-SC shall support end-to-end encryption and associated key man-agement mechanisms to ensure that only authorised users can access the SDMB service.	PA	Existing encryp-tion and key management capability of LogicaCMG plaftorm will be used.	BMSC.TB.REQ.16
	5.4	**Performance requirements**			
BM-SC.C.REQ.31		The BM-SC shall be able to support one or more SDMB services simulta-neously.	A		BMSC.TB.REQ.18

6.2   Test Bed R2 Specific Requirements

6.2.1 LogicaCMG Specific Requirements

The section defines the derived requirements on the BM-SC for the TBR2 that will be met by the LogicaCMG components.

BMSC.TB.REQ.01. The BM-SC shall be able to support separate standard Ethernet interfaces towards the application servers (eg UD-Push Server) and also towards the Hub and GPRS network.

Satisfies: **[MAE-D6-1-T-REQ-099]**

Satisfies: **[MAE-D6-1-T-REQ-073]**

Verifies: **[BM-SC.C.REQ.02]**

Verifies: **[BM-SC.C.REQ.05]**

Verifies: **[BM-SC.C.REQ.06]**

BMSC.TB.REQ.02. The BM-SC shall be capable of supporting a tunnelled connection with the Hub if required for the TBR2 (use of GRE tunnelling assumed).

Satisfies: **[MAE-D6-1-T-REQ-099]**

BMSC.TB.REQ.03. The BM-SC shall support the establishment of broadcast bearers using a signalling control plane interface between the BM-SC and the Hub (ie the Gmb* interface).

Note that IETF DIAMETER or RADIUS protocols are appropriate choices on this interface. The favoured option is currently RADIUS.

Verifies: **[BM-SC.C.REQ.01]**

BMSC.TB.REQ.04. This Gmb* interface implemented for TBR2 shall include the capability to specify the QoS parameters that must be provided by the radio bearer created by the Hub.

Verifies: **[BM-SC.C.REQ.10]**

BMSC.TB.REQ.05. The Gmb* interface shall support Session Start and Session Stop procedures to control the establishment and tearing down of bearer services over the test bed system by the Hub.

Verifies: **[BM-SC.C.REQ.11]**

BMSC.TB.REQ.06. The BM-SC shall authenticate all messages exchanged with the TBR2 end users using PKI certificates before allowing access to any services.

Note that a correctly configured Windows 2003 Server machine must be available within TBR2 to act as Certificate Authority for this functionality to work.

Satisfies: **[MAE-D6-1-T-REQ-074]**

Verifies: **[BM-SC.C.REQ.27]**

BMSC.TB.REQ.07. The BM-SC shall provide the means for the TBR2 end user to generate a PKI certificate request, submit it to the Certificate Authority, and store the resulting certificate and keys locally on the TE.

Note that a correctly configured Windows 2003 Server machine must be available within TBR2 to act as Certificate Authority for this functionality to work.

Satisfies: **[MAE-D6-1-T-REQ-074]**

BMSC.TB.REQ.08. The BM-SC shall provide a service and subscription management database into which the following information can be provisioned as a minimum:

- Details of the user services that are to be supported by the test bed (ie streaming and download services, including appropriate end-end QoS).

- Details of the SDMB bearer services required to support the various user services (including appropriate bearer level QoS parameters).

- Details of the TBR2 end users subscriptions.

- Details of the access privileges that the test bed end users have to the above services.

Verifies: **[BM-SC.C.REQ.24]**

Verifies: **[BM-SC.C.REQ.17]**

Verifies: **[BM-SC.C.REQ.18]**

Verifies: **[BM-SC.C.REQ.25]**

BMSC.TB.REQ.09. The BM-SC shall provide a web front end to allow provisioning and management of subscription data into the database.

Verifies: **[BM-SC.C.REQ.24]**

BMSC.TB.REQ.10. The BM-SC shall verify that the end user has the necessary privileges to be able to receive the requested service based upon the end user's subscription details stored in the BM-SC database.

Satisfies: **[MAE-D6-1-T-REQ-075]**

Verifies: **[BM-SC.C.REQ.28]**

BMSC.TB.REQ.11. The BM-SC shall provide a mechanism for subscribed ser-vices to be advertised (using CDD metadata provided by the UDPush Server) to the TBR2 end user and for the user to re-quest access to one or more of these services.

Verifies: **[BM-SC.C.REQ.15]**

BMSC.TB.REQ.12. The BM-SC shall support the reception of IP multicast packets from the TBR2 application servers on an Ethernet LAN inter-face (e.g. streaming server, UDPush server).

Verifies: **[BM-SC.C.REQ.21]**

BMSC.TB.REQ.13. The BM-SC shall support IP-based encryption of IP multicast packets. These packets may originate from any type of multi-cast application server (including streaming audio and video and file downlowd).

Satisfies: **[MAE-D6-1-T-REQ-075]**

Satisfies: **[MAE-D6-1-T-REQ-077]**

Verifies: **[BM-SC.C.REQ.30]**

BMSC.TB.REQ.14. The BM-SC shall support the reception of unencrypted multicast packets (from the TBR2 application servers) on one interface and the transmission of encrypted multicast packets on a second interface (towards the Hub).

Satisfies: **[MAE-D6-1-T-REQ-075]**

Satisfies: **[MAE-D6-1-T-REQ-077]**

Verifies: **[BM-SC.C.REQ.20]**

Verifies: **[BM-SC.C.REQ.22]**

BMSC.TB.REQ.15. The BM-SC shall provide an encryption key management protocol that is capable of supporting groups of users in an efficient manner to minimise management overheads on the network.

Satisfies: **[MAE-D6-1-T-REQ-075]**

BMSC.TB.REQ.16. The BM-SC shall provide a facility which handles the generation and distribution of encryption keys to authorised TBR2 end users so that they are able to decrypt the services that they have been authorised to access.

Satisfies: **[MAE-D6-1-T-REQ-075]**

Verifies: **[BM-SC.C.REQ.30]**

BMSC.TB.REQ.17. The BM-SC shall be capable of encrypting multicast packets at data rates consistent with the maximum data rate supported by TBR2 (ie up to 384 kbps).

BMSC.TB.REQ.18. The BM-SC shall be able to encrypt multicast packets from multiple applications simultaneously.

Verifies: **[BM-SC.C.REQ.31]**

6.2.2 UDCast Specific Requirements

The section defines the derived requirements on the BM-SC for the TBR2 that will be met by the UDCast components.

UDC.TB.REQ.01. The RMT shall be able to encode content delivered by third part streamer (e.g. VideoLAN) using ASM multicast contribution network like VLAN or flies stored in a specified directory using well known access protocols (FTP, web, SAMBA…). It shall interface with other downstream equipment using Ethernet and standard interfaces (10/100/1000BT Ethernet, IP address scheme, SAMBA or UNIX NFS) like the BMSC encryption devices.

Satisfies: **[MAE-D6-1-T-REQ-099]**

Satisfies: **[MAE-D6-1-T-REQ-073]**

Verifies: **[BM-SC.C.REQ.12]**

UDC.TB.REQ.02. The RMT server shall be able to send selective content on the interactive link depending on the type of service and selected back up mechanism.

Satisfies: **[MAE-D6-1-T-REQ-085]**

UDC.TB.REQ.03. The RMT server SLA shall be configured before service starts via a web based GUI. This information will be made available to the BMSC for QoS configuration purposes. The SLA is a per Content Provider and Service category information. [Note that the signalling between RMT and LCMG if FFS.]

Verifies: **[BM-SC.C.REQ.10]**

Verifies: **[BM-SC.C.REQ.19]**

UDC.TB.REQ.04. The RMT server shall send service announcement messages before, during and after the transmission so that the TE is able to know how to retrieve the content (codec, multicast group address and port number etc). The service parameters will be known to the BMSC for QoS configuration purposes.

Verifies: **[BM-SC.C.REQ.11]**

Verifies: **[BM-SC.C.REQ.15]**

Verifies: **[BM-SC.C.REQ.17]**

Verifies: **[BM-SC.C.REQ.18]**

UDC.TB.REQ.05. The RMT server shall implement per session QoS (for streaming services each session will have its own dedicated bandwidth, whilst for download services files are enqueued according to their priority). The BMSC therefore does not need to implement a per session QoS but only a per service QoS.

Verifies: **[BM-SC.C.REQ.18]**

UDC.TB.REQ.06. The RMT server shall implement per session Connection Admission Control according to a pre-configured SLA. Any non-conforming session shall then be rejected.

Verifies: **[BM-SC.C.REQ.19]**

UDC.TB.REQ.07. The RMT server shall generate multicast traffic after encoding of the data (video, audio, data). Downstream equipment (like the BM-Sc) will therefor see "only" IP multicast UDP packets.

Satisfies: **[MAE-D6-1-T-REQ-077]**

Verifies: **[BMSC.TB.REQ.12]**

Verifies: **[BMSC.TB.REQ.13]**

Verifies: **[BM-SC.C.REQ.20]**

UDC.TB.REQ.08. The RMT service center shall implement transport layer functions and application layer functions for both file download and streaming services.

Satisfies: **[MAE-D6-1-T-REQ-074]**

Satisfies: **[MAE-D6-1-T-REQ-107]**

Verifies: **[BM-SC.C.REQ.21]**

UDC.TB.REQ.09.   The RMT service centre shall implement transport layer functions and application layer functions for multiple simultaneous services.

Verifies: **[BM-SC.C.REQ.31]**

UDC.TB.REQ.10.   The number of simultaneously supported sessions is 100.

Verifies: **[BM-SC.C.REQ.31]**

UDC.TB.REQ.11.   The maximum overall supported data rate shall be 20 Mbps.

UDC.TB.REQ.12.   The transport layer functions of the RMT server shall include: packet level FEC, packet level interleaving, carousel, and selective retransmissions.

Satisfies: **[MAE-D6-1-T-REQ-074]**

Satisfies: **[MAE-D6-1-T-REQ-076]**

UDC.TB.REQ.13.   The RMT server will be able to schedule transfers and retransmissions.

Verifies: **[BM-SC.C.REQ.13]**

UDC.TB.REQ.14.   The RMT server shall implement a multicast addressing scheme.

Satisfies: **[MAE-D6-1-T-REQ-077]**

UDC.TB.REQ.15.   The RMT server shall append a tag to every content to indicate whether it has to be distributed using download or streaming applications.

Satisfies: **[MAE-D6-1-T-REQ-089]**

UDC.TB.REQ.16.   The RMT server shall be able to transmit data using both the GPRS network and the SDMB network though the selection between the two networks shall not be base upon audience or QoS criteria

Satisfies: **[MAE-D6-1-T-REQ-066]**

Satisfies: **[MAE-D6-1-T-REQ-085]**