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D6-1.2a

SDMB System - Technical Requirement Document (for Commercial System)

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Abstract:

This document includes the specification of the Satellite Digital Multimedia Broadcasting (SDMB) commercial system as well as the specification of the key features/performances of this system that will be validated through the second MAESTRO test-bed release.

Keyword list: [SDMB system requirements commercial](#)

EXECUTIVE SUMMARY

This document contains deliverable D6-1.2a of the IST Integrated Project MAESTRO – Mobile Applications & sErVICES based on Satellite and Terrestrial inteRwOrking (IST Integrated Project n° 507023).

The MAESTRO project aims at studying technical implementations of innovative mobile satellite systems concepts targeting at 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.

The work package 6 «Architecture» aims at:

- Identifying the Technical Requirements of the SDMB system
- Defining an SDMB system architecture that inter works with the 3GPP architecture and meets all system requirements,
- Defining the functions and interfaces of SDMB all sub-systems namely User Equipment, Intermediate Module Repeater, space segment, hub and service centre,
- Estimating the cost impacts of SDMB features on 3G handset and on BM-SC
- Estimating the manufacturing and installation costs associated to the terrestrial repeater.
- Estimating the development cost of the hub.
- Analysing the impacts of SDMB system on the 3G mobile network.

The deliverable D6-1.2a – « SDMB System Technical Requirement document (for Commercial System)» is one of the deliverables of the task 6.1 « *System requirements*»

The task is led by ASP and is supported actively by all MAESTRO partners.

This document includes both the specification of the commercial system and the specification of the key features/performances of this system that will be validated through the second MAESTRO test bed release.

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3.1	December 2004	Rework according to WP6 comments: <ul style="list-style-type: none"> ➤ Add ETSI/OMA standard in reference, revise documents tree ➤ Identify user services vs delivery methods (download/streaming) ➤ Add a general presentation of the system (common section with system DD) ➤ Introduce Electronic Service Guide ➤ Review requirements applicability to R2 test bed ➤ And many other corrections
3.2	December 2004	Rework according to other WP comments: <ul style="list-style-type: none"> ➤ Add flexibility requirements for Space segment and terrestrial repeaters ➤ Typos corrections
3.3	December 2004	Final version for delivery

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1 INTRODUCTION

1.1 BACKGROUND

The deliverable D6-1.2a – « SDMB System Technical Requirement document (for Commercial System)» is one of the deliverables of the task 6.1 « *System requirements*».

The task is led by ASP.

This document includes the specification of the commercial system and the applicability of these requirements to the MAESTRO test bed release 2.

The overall summary is the following one:

1. Introduction
2. Documentation Reference System
3. Terms, Definitions, Abbreviated terms and Symbols
4. General presentation of the system
5. Commercial system requirements

6. Applicability of the Commercial system requirements to the MAESTRO test bed release 2.

The chapter 4 intends to present the SDMB Commercial SDMB system without formal requirement.

Formal requirements shall be expressed exclusively in chapters 5 and 6.

1.2 FIELDS OF APPLICATION

This document is applicable:

- to the design of the commercial SDMB system
- to the design of the MAESTRO test bed release 2 (R2).

It is intended to be used by all teams in charge of specifying, designing, developing, integrating or validating any piece of the SDMB system.

2 DOCUMENTARY REFERENCE SYSTEM

2.1 APPLICABLE DOCUMENTS

MAESTRO D1-1 SDMB role model

MAESTRO D1-5 Commercial Service requirements

MAESTRO D1-6 PPDR Service requirements

MAESTRO D1-8 Mission Requirements

2.2 STANDARDS

SA WG1

- TS 22.146 «Multimedia Broadcast/Multicast Service» Stage 1 requirements
- TS 22.246 «Multimedia Broadcast/Multicast Service» Stage 1 MBMS user services

SA WG2

- TR 23.846 «Multimedia Broadcast/Multicast Service; stage 2 report
- TS 23.246 Multimedia Broadcast/Multicast Service (MBMS); Architecture and functional description

SA WG3

- TS 33.246 3G Security; Security of Multimedia Broadcast/Multicast Service (MBMS)

SA WG4

- TS 26.346 Multimedia Broadcast/Multicast Service (MBMS); Protocols and codecs

RAN WG2

- TR 25.992 «Multimedia Broadcast/Multicast Service (MBMS); UTRAN/GERAN requirements»
- TR 25.346 «Introduction of Multimedia Broadcast/Multicast Service (MBMS); in Radio Access Network» Stage2

RAN WG1

- TR 25.803 S-CCPCH performance for MBMS

CN1

- TR 29.846 «Multimedia Broadcast/Multicast Service» CN1 procedure description

ETSI

- SR 002 182 "Requirements for communications from authorities/organisations to the citizens during emergencies".
- ETSI TR 102 277 : Satellite Earth Stations and Systems (SES); Satellite Component of UMTS/IMT-2000; Satellite Component for Multimedia Broadcast/Multicast Service (MBMS); W-CDMA Radio Interface.
- ETSI TR 102 058 : Satellite Earth Stations and Systems (SES); Satellite Component of UMTS/IMT-2000; Evaluation of the W-CDMA UTRA FDD as a Satellite Radio Interface.

OMA

- Mobile Broadcast services requirements.

2.3 REFERENCE DOCUMENTS

2.4 DOCUMENTS TREE

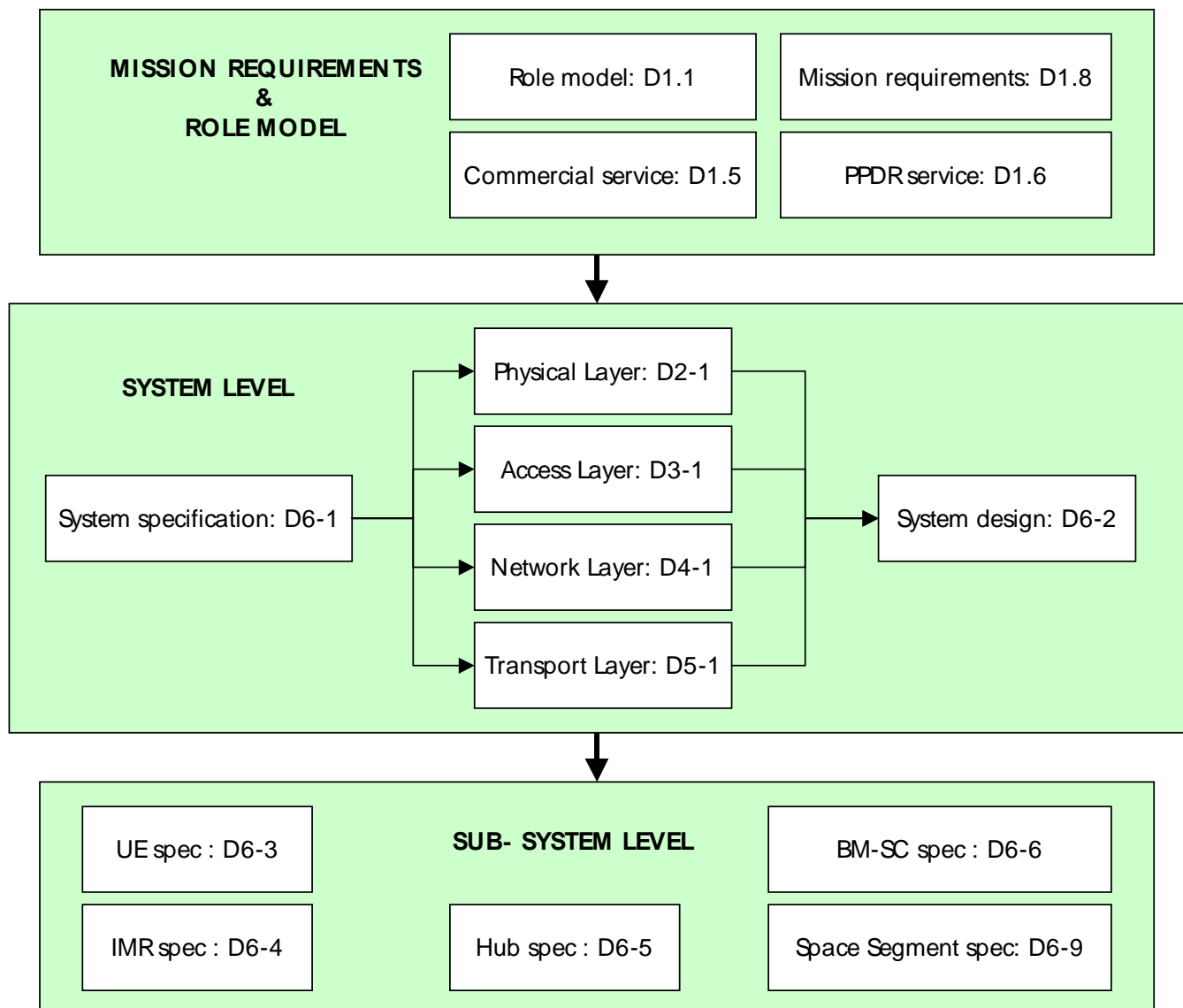


Figure 1 : Maestros document tree (partial)

2.5 ORDER OF PRECEDENCE

To be defined.

3 TERMS, DEFINITIONS, ABBREVIATED TERMS AND SYMBOLS

3.1 TERMINOLOGY AND DEFINITIONS

Version 1.4

BM-SC	Means the BM-SC as defined for MBMS and including specific SDMB features
Cell	Means the Terrestrial mobile network cell
Content	File or data stream transmitted by the SDMB system and possibly (for the Download service) completed by terrestrial retransmissions
Download delivery method	A delivery method that delivers some multimedia content with loose time constraints. The service is best map on 3GPP defined background traffic class capability.
End User	The End user owns the terminal, subscribes to the MNO & Mobile Portal services
Groupcast service	A service offered to end-user allowing to send in a cost efficient way the same content to a group of users. This may include streaming or download.
SDMB service	A push service that delivers a set of Multimedia content to several recipients. The service includes information, which allows the user equipment to process the content according to the end-user's rights and terminal capabilities. The access to the service may be restricted to a certain group of users which may have to pay a fee.
Relevant content	A multimedia content which is expected to interest the end user with respect to its user preference profile.
Service area	Refers to the area where the SDMB services are available. Basically it is defined taking into account a set of satellite spots providing the European coverage.
Spot area	Corresponds to the areas covered by a satellite spot beam. There is not necessarily a service continuity between two spot areas. We assume that the same data is datacast in a spot area and it differs from the data datacast in other spot areas.
Streaming delivery method	A delivery method that delivers some multimedia content with real time constraints. It may refers to TV or radio type of services. Such service is manually activated by the end-user. Content are played as soon as received by the end-user terminal. The service is best map on 3GPP defined streaming traffic class capability.
Terrestrial mobile network	The terrestrial mobile network(s) on which the SDMB system relies.
UE	The UMTS/GSM User equipment modified to include SDMB features.

User preference profile	The description of the SDMB-content related user preferences (preferred user services) in the UE.
User service	A consistent set of contents, distributed using a given delivery method.

3.2 ABBREVIATIONS

Version 1.5		CCN	Contract Change Notice
2G	Second Generation (Mobile communication system)	CDD	Content Delivery Descriptor
3G	Third Generation (Mobile communication system)	CDMA	Code Division Multiple Access
3GPP	3rd Generation Partnership Project	CDN	Content Delivery Network
A-CIT	Alcatel CIT, France (MAESTRO Partner)	CNP	Combined Network Planning
AAC+	Improved Advanced Audio Coding	COTS	Commercial Off The Shelf
ABFN	Analogue Beam Forming Network	CPICH	Common Pilot Channel
ACI	Adjacent Channel Interference	CTCH	Common Traffic Control Channel
ACIR	Adjacent Channel Interference Ratio	DL	DownLink
ACLR	Adjacent Channel Leakage Ratio	DMB	Digital Multimedia Broadcasting
ACS	Adjacent Channel Selectivity	DRM	Digital Rights Management
ADC	Analogue to Digital Conversion	DSP	Digital Signal Processing
AGC	Automatic Gain Control	DVB	Digital Video Broadcasting
AGILENT	Agilent Technologies Belgium SA, Belgium (MAESTRO Partner)	DVB-S	DVB Satellite
AM/AM	Amplitude – Amplitude transfer function	EC	European Commission
AM/PM	Amplitude – Phase transfer function	EIRP	Equivalent Isotropically Radiated Power
ASC	Ascom Systec AG, Swiss (MAESTRO Partner)	ERCOM	Ercom Engineering Reseaux Communications, France (MAESTRO Partner)
ASEL	Alcatel SEL AG, Germany (MAESTRO Partner)	ESA	European Space Agency
ASP	Alcatel Space, France	ESG	Electronic Service Guide
AWE	AWE Communications GMBH, Germany (MAESTRO Partner)	E-TF1	E-TFI, France (MAESTRO Partner)
AWGN	Additive White Gaussian Noise	ETSI	European Telecommunications Standard Institute
BCF	Base Common Functions	EVM	Error Vector Magnitude
BCH	Broadcast Channel	FDD	Frequency Division Duplex
BER	Bit Error Rate	FDM	Frequency Division Multiplex
BLER	BLock Error Rate	FDMA	Frequency Division Multiple Access
BM-SC	Broadcast Multicast Service Center	FEC	Forward Error Correction
BS	Base Station	FHG/IIS	Fraunhofer Gesellschaft e.V., Germany (MAESTRO Partner)
BT	British Telecommunications PLC, United Kingdom (MAESTRO Partner)	FP5	5th Research Framework Program of the European Commission
BYTL	Bouygues Telecom, France (MAESTRO Partner)	FP6	6th Research Framework Program of the European Commission
CBS	Cell Broadcast Service	FSS	Fixed Satellite Services
CCI	Co-Channel Interference	G/T	Figure of merit
		GD	Group Delay
		GEO	Geostationary Earth Orbit

GF	Gain Flatness	MPEG4	Motion Picture Experts Group 4 (Standard - Compressed Video at 64 Kbps)
GFI	GFI Consulting, France (MAESTRO Partner)	MSC	Mobile Switching Centre
GNSS	Global Navigation Satellite System	MSPS	Motorola Toulouse SAS, France (MAESTRO Partner)
GPRS	General Packet Radio Service	MSS	Mobile Satellite Services
GSM	Global System for Mobile Communications	NLOS	Non Line Of Sight
GUI	Graphic User Interface	Node B	UMTS Base Station
GW	Gateway	O&M	Operation and Maintenance
HDFSS	High Density FSS	OBO	Output Back-Off
HLR	Home Location Register	OMA	Open Mobile Alliance
HPA	High Power Amplifier	OMC	Operation and Maintenance Center
HTML	Hyper Text Markup Language	OMUX	Output Multiplexer
HW	Hardware	PA	Power Amplifier
I/O	Input / Output	P-CCPCH	Primary Common Control Physical Channel
IBO	Input Back-Off	PCDE	Peak Code Domain Error
IMR	Intermediate Module Repeater	PER	Packet Error Rate
IMT-2000	International Mobile Telecommunications 2000	PFD	Power Flux Density
IP	Internet Protocol	PICH	Paging Indicator Channel
IRT	Intelligent Ray Tracing	PIM	Protocol Interface Module
IST	Information Society & Technology	PLMN	Public Land Mobile Network
ITU	International Telecommunication Union	P-SCH	Primary Synchronisation Channel
KO	Kick-Off	PSSP	Public Security Service Provider
LBS	Location Based Services	PTP	See p-t-pt
LDR	Large Deployable Reflector	p-t-p	Point to Point
LMS	Land Mobile Satellite	PVR	Personal Video Recorder
LNA	Low Noise Amplifier	QoS	Quality of Service
LNB	Low Noise Block	R1	MAETRO Test Bed Release 1
LOGICACMG	LogicaCMG UK Limited, United Kingdom (MAESTRO Partner)	R2	MAETRO Test Bed Release 2
LOS	Line Of Sight	RAN	Radio Access Network
LTWTA	Linearised Travelling Wave Tube Amplifier	RLC	Radio Link Control
MAC	Medium Access Control	RNC	Radio Network Controller
MAESTRO	Mobile Applications & sErVICES based on Satellite and Terrestrial inteRwOrking	RNPT	Radio Network Planning Tool
MBMS	Multimedia Broadcast/Multicast Service	RNS	Radio Network Subsystem
MM	MultiMedia	SAP	Service Access Point
MMI	Man Machine Interface	S-CCPCH	Secondary Common Control Physical Channel
MMS	Multimedia Messaging Service	SDMB	Satellite Digital Multimedia Broadcasting
MNO	Mobile Network Operator	S-DMB	See SDMB
MoDis	IST FP5 Mobile Distribution project - MOBILE Digital broadcast Satellite	SES	SES Astra, Luxembourg (MAESTRO Partner)
MP3	Moving Picture Experts Group Layer-3 Audio (audio file format/extension)	SF	Spreading Factor
MPA	Multi-Port Amplifier	SFN	Single Frequency Network
MPC	Multi-Port Combiner	SGSN	Serving GPRS Support Node
MPD	Multi-Port Divider	SIM	Subscriber Identity Module
		SMS	Short Message Service
		SLA	Service Level Agreement

SPH	Space Hellas SA, Greece (MAESTRO Partner)	UNIS	The University of Surrey, United Kingdom (MAESTRO Partner)
S-SCH	Secondary Synchronisation Channel	UoB	Alma Mater Studiorum Universita Di Bologna, Italy (MAESTRO Partner)
SSPA	Solid State Power Amplifier	URAN	UMTS Radio Access Network
S-UMTS	Satellite UMTS	USB	Universal Serial Bus
SW	Software	UT	User Terminal
TBC	To Be Confirmed	UTRA	UMTS Terrestrial Radio Access
TBD	To Be Defined	UTRAN	UMTS Terrestrial Radio Access Network
TDD	Time Division Duplex	Uu	UMTS air interface
T-UMTS	Terrestrial UMTS	W-CDMA	Wideband Code Division Multiple Access
TV	Television	WH	Walsh – Hadamard
TWTA	Travelling Wave Tube Amplifier	WP	Work Package
UCL	University College London, United Kingdom (MAESTRO Partner)	WRC	World Radio Conference
UDCAST	Udcast, France (MAESTRO Partner)	XHTML	Extensible Hypertext Markup Language
UE	User Equipment	XML	eXtensible Markup Language
UMTS	Universal Mobile Telecommunications System		

4 GENERAL PRESENTATION OF THE SYSTEM

Version 1.2

4.1 Perspectives of the system

In the context of a growing market toward mobile multimedia, studies led to the innovative concept of Satellite Digital Multimedia Broadcast (referred as SDMB in the rest of the document).

The SDMB satellite system aims at providing a dependable and cost effective broadcast/multicast capability for mobile services over a pan-European coverage. It makes use of 3GPP (3rd Generation Partnership Project) standardised technologies, IMT2000 satellite frequency bands and high power geostationary satellite(s) in order to accommodate low cost 3G handsets with indoor reception.

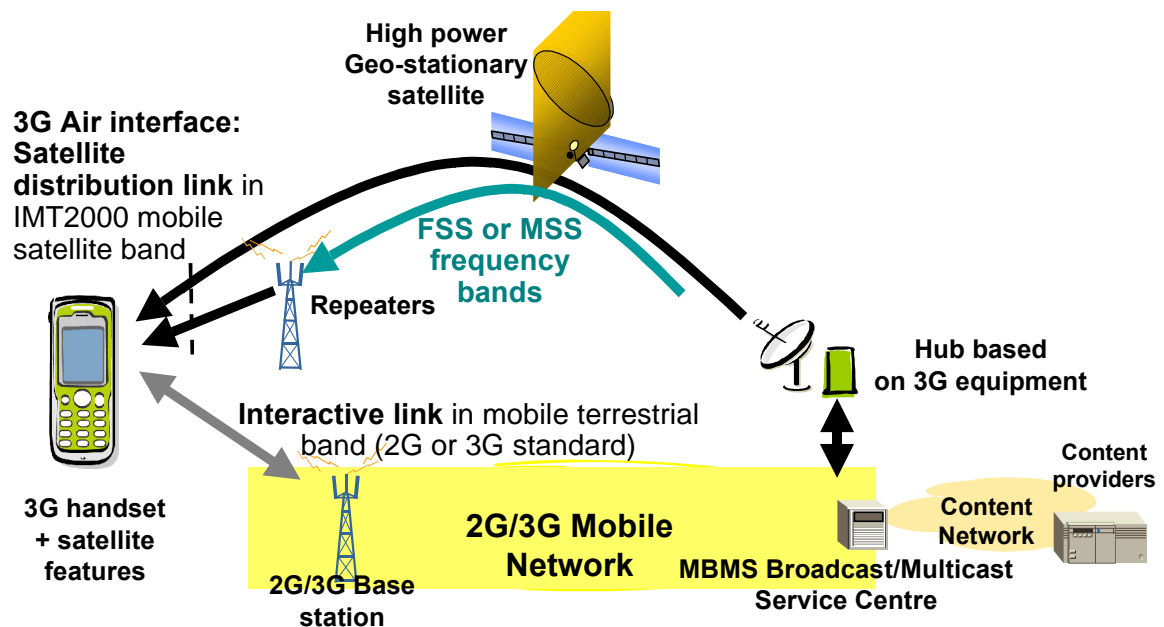


Figure 2 : SDMB system overview

4.2 Definition of the market

Mobile content business are expected to exceed by far wired Internet thanks to the flexible and proven billing capability of mobile networks. As an example, world-wide mobile Content revenues already exceeded 3B€ in 2003 mainly with mobile ring-tones.

Mobile video services are expected to be very popular and end users who are interested in video services have similar interest in viewing content provider services as generating their own content.

In addition, Media operators see real business opportunity in mobile content. Content production will be a subset of fixed programs tailored for mobile. It will mainly give priority to video services and interactivity such as on demand, voting, gambling.

In this context, there is a consensus around one to many distribution as the missing scheme in 3G network economics to deliver mobile rich content services to end users in a cost effective manner. Several initiatives aim at providing one to many distribution for 3G mobile networks. The market identified by the SDMB system is the data broadcasting towards mobile handsets, taking benefit from the natural broadcasting nature of the geostationary satellites.

The world region identified as a primary market is Europe.

Since this issue is still open, the possible nation-wide/linguistic spot beams according to market expectations are :

- Spain/Portugal,
- Italy,
- France, Belgium and Luxembourg,
- UK and Ireland,
- Germany, Switzerland, Austria and Netherlands
- and Greece.

S-DMB system is primarily designed for mass market standard commercial purpose. It also allows pre-emption of the transmission resources by authorised organisation (police, civil protection...) for providing specific services for crisis prevention and management (Public Protection and Disaster Relief Missions).

4.3 Definition of the missions of the system

The purpose of the SDMB system is to provide a distribution capacity for several mobile operators to deliver cost effective streaming and download services directly to mobile handsets over umbrella cells in both outdoor and indoor environments.

The system shall not introduce constraints on the user terminal or the consumer itself. In other words, it shall be as transparent as possible to 3G handsets with respects to cost, autonomy, form factor, aesthetics to maximise market penetration. To do that, the SDMB system is based onto the broadcast mode of MBMS.

It is assumed that at the time of deployment of the SDMB system, most mobile handsets will be able to operate on both 2G and 3G types of networks. Conversely, the 3G mobile networks will most likely be limited to urban areas. The SDMB system has then to be compatible of both 2G and 3G networks to be able to offer its services everywhere.

The SDMB system is open in the sense it has to be compatible with the end-to-end framework defined by the Open Mobile Alliance (OMA).

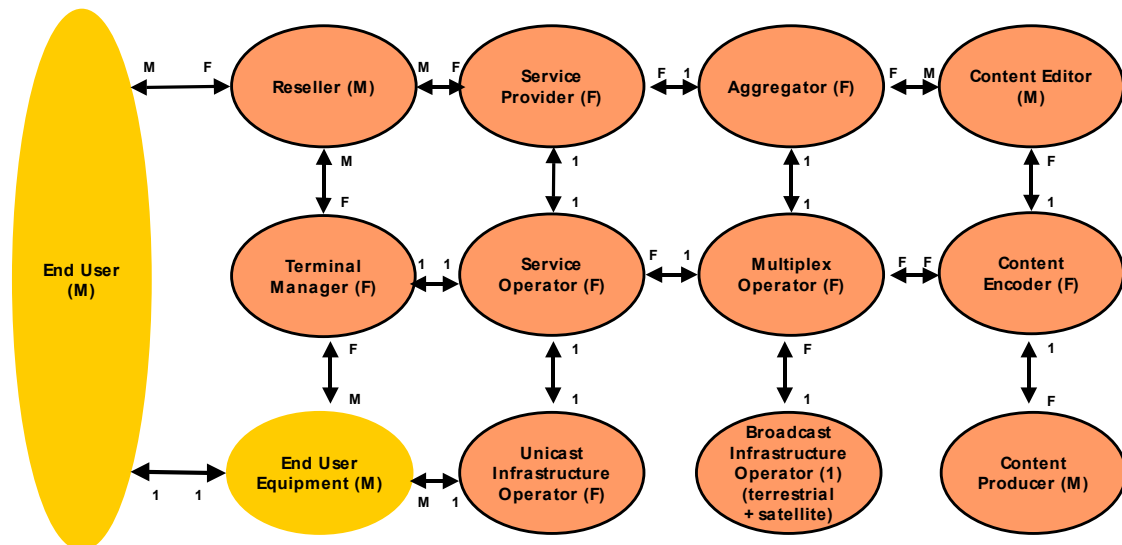
In addition, the system aims at complementing 2G and 3G mobile system by achieving the true anywhere and anytime challenge with a dependable infrastructure offering point to point services capability via satellite over permanent or temporary zones not covered by the terrestrial networks. This requires a satellite uplink from the user terminal.

This document is devoted to the datacast mission. The requirements associated to the direct satellite point to point mission are not analysed.

4.4 Category of users and associated characteristics

A «Role» is a subset of technical and business missions, to be taken over inside the service delivery chain. The missions assigned to a same Role are interrelated, and designed to be coherent from the organisational point of view, which includes management and quality of service objectives, information systems, processes, and technical competencies to be involved.

The SDMB role model is described in detail in D1-1 and may be summarised in the next figure:



Examples :

- Per country, many (M) Content Editors may be working for SDMB Services, but only a few number (F) of Aggregators
- The Broadcast Infrastructure Operator can have to deal with a few number of Multiplex Operators ; but one aggregator deals always with only one Multiplex Operator

Figure 3 : SDMB Role model and cardinality per country (from D1-1)

10 main Roles have been identified in the S-DMB Service Delivery Chain :

- **Reseller, Service Provider, Aggregator and Content Editor** are part of the «**Service Design and Marketing**» upper service layer, which covers all commercial activities involved in the S-DMB system: marketing studies, service offering, sales, billing, ..., from the content selection and edition, until the sales to End users,
- **Terminal Manager, Service Operator, Multiplex Operator and Content Encoder** are part of the «**Service Operation**» intermediate layer, which has to produce effective services, and to manage the technical consistency of S-DMB Service delivery technical

chain. These Roles must work together to implement common standards, in order to be able to encode and carry the content that will be broadcast and to read it on the end user terminal

- **Unicast Infrastructure Operator and Broadcast Infrastructure Operator** are part of the «**Infrastructure Operation**» lower layer, which provides the communication infrastructure capacity able to carry the content to end users terminals.

The relationship between the different roles are also described in detail in D1-1 and may be summarised in the figure below:

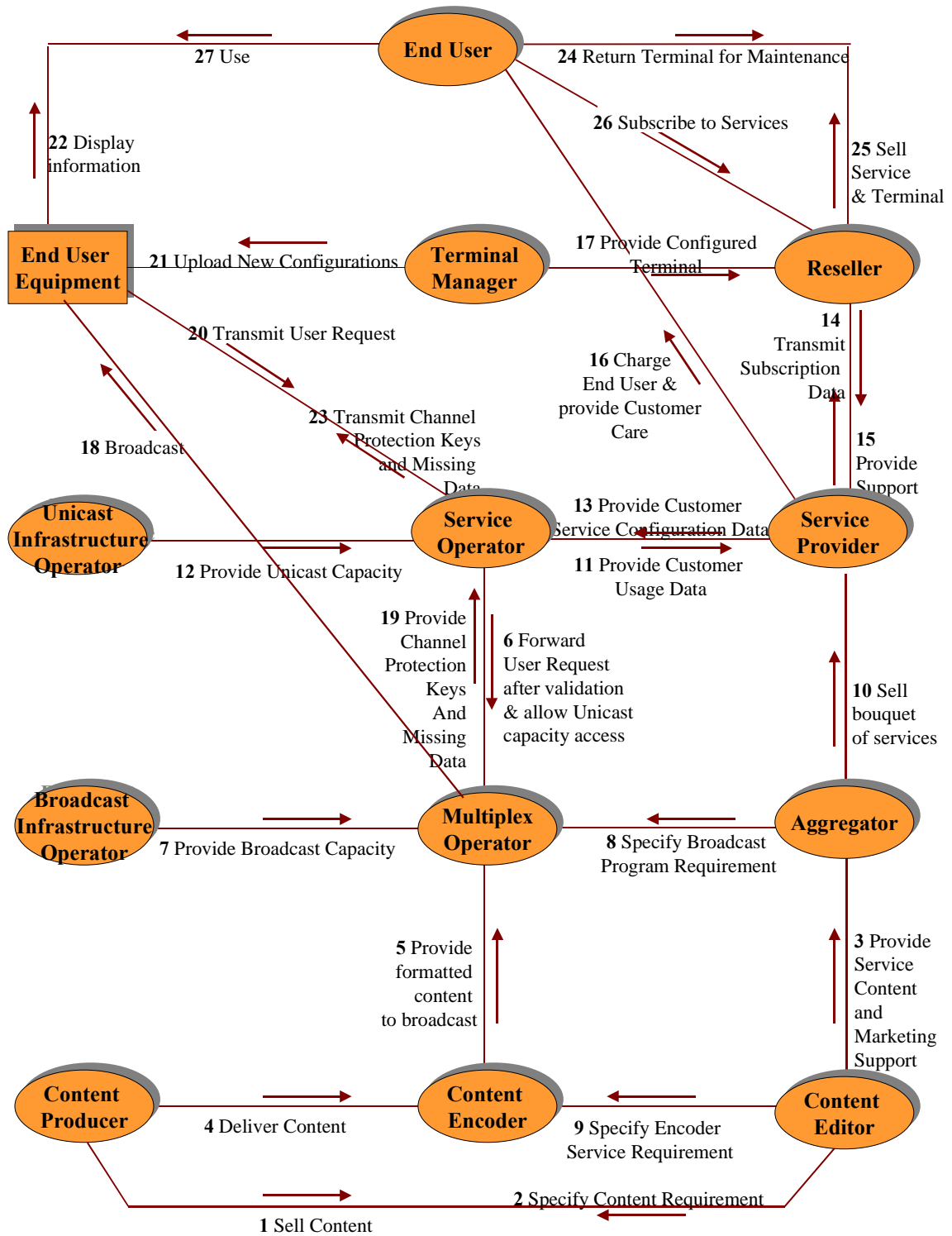


Figure 4 : SDMB Roles relationship (from D1-1)

The different roles defined in D1-1 may be assigned to different business actors (i.e. Companies), which implies the responsibility sharing between these actors.

In given market conditions, each Business Actor Model scenario tends to determine the number of actors playing the S-DMB Roles.

Different Business Actor scenarios could coexist in different countries..

It is assumed that a Role has generally to be taken in charge by one actor only, i.e. the Role responsibility can not be split; obviously, the actor in charge may delegate part of his missions to subcontractors or suppliers.

To minimise the dependencies of the system engineering with respect to the Business Actor scenarios, the stakeholders of the SDMB system are described in terms of roles and not in terms of actors.

4.5 Operating environment

4.5.1 Development context

The SDMB system encompasses

- a Satellite based infrastructure operating in the IMT2000 frequency band allocated to mobile satellite systems. This infrastructure is made of geo-stationary satellites, satellite operation centres, terrestrial repeaters and uplink earth stations.
- 3GPP UTRA FDD UTRAN standardised user equipment implementing SDMB specific features which at least includes the extension to the satellite frequency band.
- 3GPP Broadcast Multicast Service Centre implementing SDMB specific features to inter-work with the SDMB infrastructure



Figure 5 : SDMB system development context

The Uu and Gmb / Gi interfaces are defined in 3GPP documentation.

The Uu* is the interface between the SDMB infrastructure and the SDMB enabled 3G User Equipment. It is a wireless interface relying on the 3GPP defined Uu interface and operating in the IMT2000 frequency band allocated to mobile satellite systems. It may implement some minor modifications such as parameter range extension.

The Gmb* is the interface between the SDMB infrastructure and the SDMB enabled 3G Broadcast Multicast Service Centre. It relies on the 3GPP defined Gmb interface. It may implement some minor modifications such as parameter range extension to allow the BM-SC to take into account the SDMB datacast resources.

4.5.2 Operational context

The SDMB system provides a datacast capacity to complement mobile system of several mobile network operators. This capacity can be used to deliver cost efficient mobile IP datacast services to 3G end users.

Interaction is required to manage the services delivered, the SDMB enabled user equipment, the mobile IP datacast service subscribers and possibly some terrestrial components of the SDMB infrastructure.

This interactive link is provided by 2G or 3G mobile systems. It can be used by mobile IP datacast services requiring real time interaction.

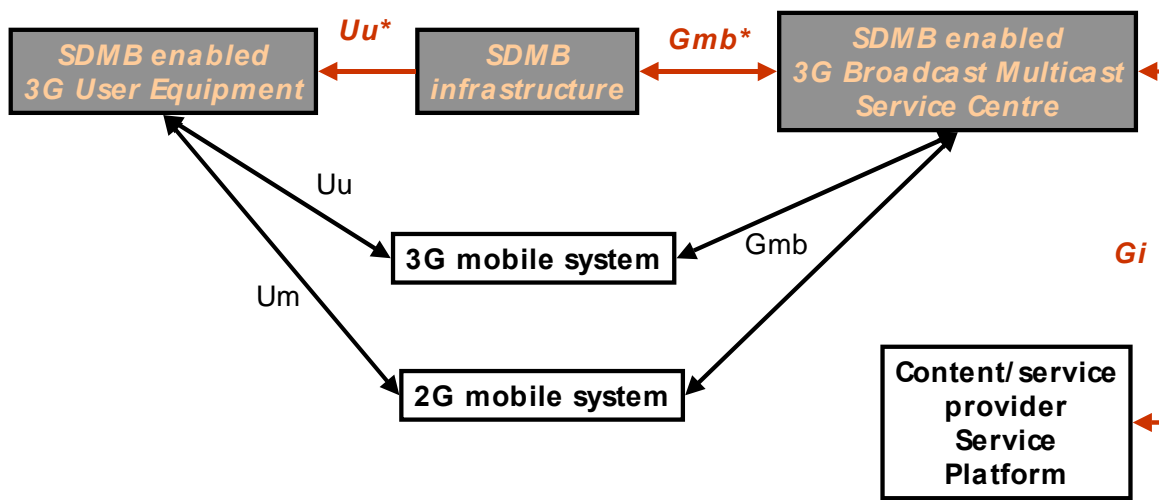


Figure 6 : SDMB system operational context

Gi is a 3GPP defined interface.

4.6 Dimensioning

The preliminary dimensioning of the SDMB system includes:

- one to three geostationary satellites that could be located in 10°E (preliminary location identified for dimensioning purpose), 15°W and 32.5°E.
- up to six spot areas,
- a number of hubs from one to the number of spots,
- several millions of end users.

4.7 Hypotheses

The considered UE is expected to be derived from a 3GPP UMTS/MBMS compliant UE.

The considered UE is expected to be equipped with an internal or external non-volatile memory to store relevant contents. Should the opposite occur, this kind of terminal would be able to received streamed data flow, but not to store contents.

The SDMB infrastructure relies on a terrestrial mobile network (UMTS or GPRS), which can possibly be 3GPP MBMS compliant.

5 COMMERCIAL PRODUCT REQUIREMENTS

5.1 EXTERNAL INTERFACE REQUIREMENTS

Reference **MAE-D6-1-C-REQ-001**

The SDMB system shall be able to interconnect to 3G packets networks via standard interfaces.

*

Reference **MAE-D6-1-C-REQ-002**

The SDMB system shall be able to interconnect to 2G packets networks via standard interfaces.

*

Reference **MAE-D6-1-C-REQ-128**

The SDMB system shall be able to interconnect to content providers via standard interfaces.

Comment: These interface are "out of scope" of 3GPP. IETF interfaces usage would be preferred.

*

NB: the interfaces towards content providers should be kept open and flexible and should not act as a constraint on the system. These interfaces could for example be anything from a content provider providing a CD or DVD on which the content is stored by hand, through to fully dynamic IP unicast or multicast interfaces. The specific interfaces eventually required to be supported will be closely linked to the specific services supported over the commercial system and the particular content providers involved and the interfaces that they support.

5.2 OPERATIONAL REQUIREMENTS

5.2.1 Operations preparation

5.2.1.1 Development system

For further study

5.2.1.2 Associated validation system

For further study

5.2.1.3 Associated maintenance system

For further study

5.2.2 Operability

For further study

5.2.2.1 General requirements for operability

Reference **MAE-D6-1-C-REQ-161**

The SDMB system shall provide each actor with the means to monitor the components he operates.

*

5.2.2.2 Ergonomics – human factors

Not applicable at system level.

5.2.2.3 Observability and Monitoring

Reference **MAE-D6-1-C-REQ-005**

The UE shall be able to indicate the SDMB services available on user demand.

[Comment: For further study](#)

*

Reference **MAE-D6-1-C-REQ-006**

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.

[Comment: For further study](#)

*

Reference **MAE-D6-1-C-REQ-007**

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

[Comment: For further study](#)

*

Reference **MAE-D6-1-C-REQ-008**

The terrestrial repeaters shall be monitored and controlled in a centralised way, by their operator.

*

Reference **MAE-D6-1-C-REQ-106**

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

[Comment: For further study](#)

*

5.2.3 Operation scenarios

5.2.3.1 Transmission media selection

Reference **MAE-D6-1-C-REQ-010**

The operational system shall implement features enabling to select a distribution link between the SDMB and terrestrial mobile network according to criteria such as targeted audience, content size, required QoS and terrestrial network capacities in terms of MBMS.

[Comment: Requirement to be confirmed by WP1](#)

*

Reference **MAE-D6-1-C-REQ-119**

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

*

5.2.3.2 Access to services and contents

Reference **MAE-D6-1-C-REQ-011**

The operational system shall allow the end user to subscribe to the SDMB service using a ptp terrestrial connection.

[Comment: For further study](#)

*

Reference **MAE-D6-1-C-REQ-012**

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

[Comment: For further study](#)

*

Reference **MAE-D6-1-C-REQ-014**

Assuming the UE to be attached to its home mobile network or to a roaming partner network, the operational system shall be able to provide contents to the UE via any terrestrial mobile network coverage, but not necessarily with the same QoS, on UE demand.

[Comment: To be further analysed in WP4](#)

*

Reference **MAE-D6-1-C-REQ-162**

The SDMB system shall allow to protect services and contents by Digital Rights Management (DRM).

*

5.2.3.3 Cohabitation with 2G-3G operations

Reference **MAE-D6-1-C-REQ-003**

The SDMB system operation shall not impact operations of UE attached to mobile networks including but not limited to paging, location update, cells monitoring, measurements, calls.

*

Reference **MAE-D6-1-C-REQ-016**

The UE shall notify the end user of incoming cellular calls or messaging whatever the SDMB service reception being active.

*

Reference **MAE-D6-1-C-REQ-015**

The UE shall be able to establish a p-t-p session (voice call, data transfer, messaging) or p-t-m session on terrestrial mobile network although the SDMB service is activated; in this case the SDMB service reception may be interrupted for the duration of the p-t-p session depending on UE capabilities.

[Comment: For further study](#)

*

5.3 FUNCTIONAL REQUIREMENTS

5.3.1 Specification of the system states

Not applicable at system level.

[Comment: Usage of MBMS states to define SDMB ones is for further study.](#)

5.3.2 Delivery methods

5.3.2.1 Delivery methods types

Reference **MAE-D6-1-C-REQ-019**

The SDMB system shall provide point to multipoint services using Download and Streaming delivery methods.

[Comment: Some of these services may be reserved to specific classes of terminal; e.g. download will be possible with UE equipped with a non-volatile memory.](#)

*

5.3.2.2 Download

The download delivery methods delivers binary data (file data) over SDMB. A UE activates an appropriate application, and uses 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.

To ensure this reliability different means are used, among which the Carousel: the data is provided to the user repetitively and may be updated at certain times to reflect changing circumstances.

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

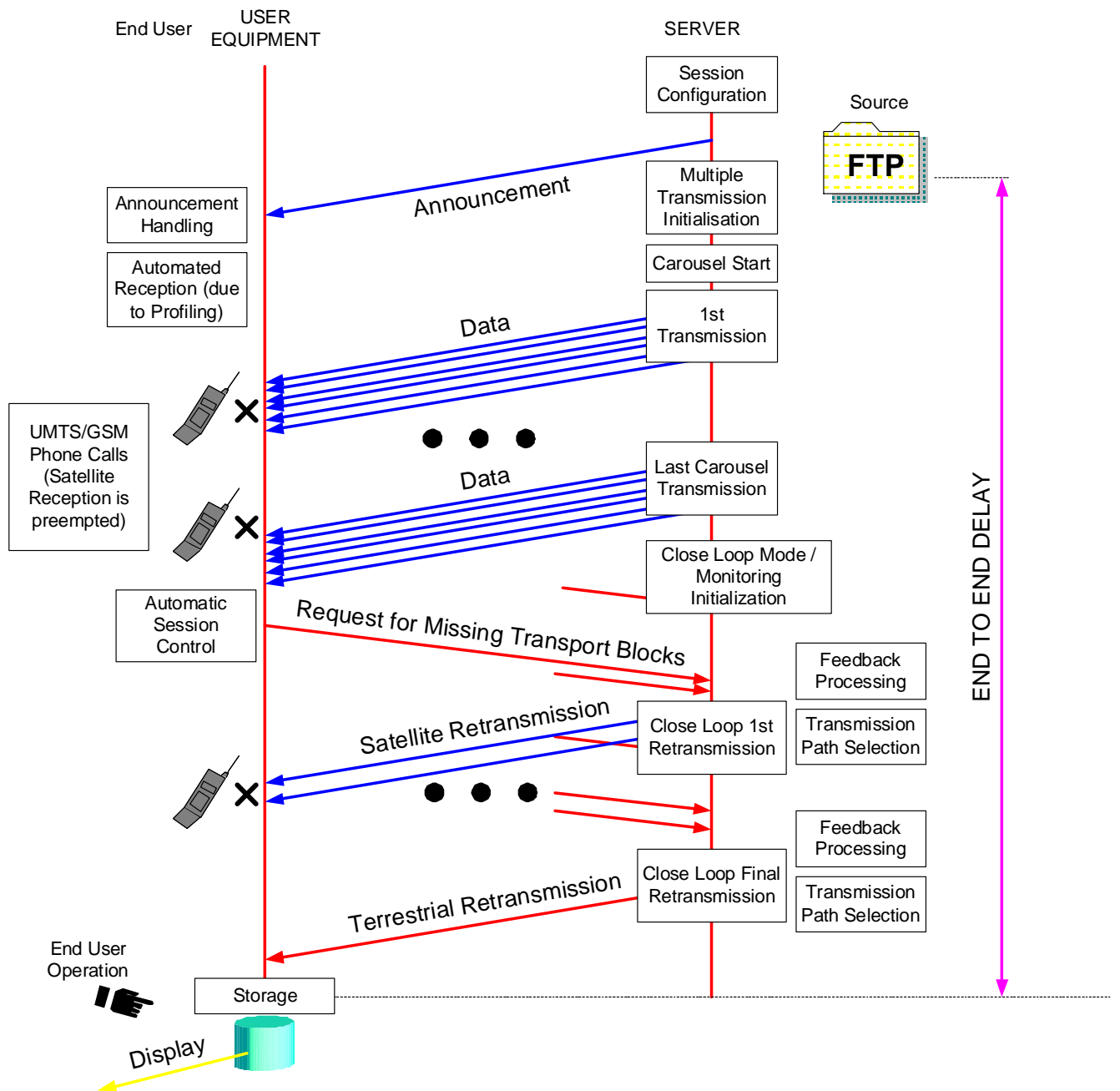


Figure 7 : Batch (cold) download procedure sample

Reference MAE-D6-1-C-REQ-155

The SDMB system shall allow distribution of files, one or several times.

*

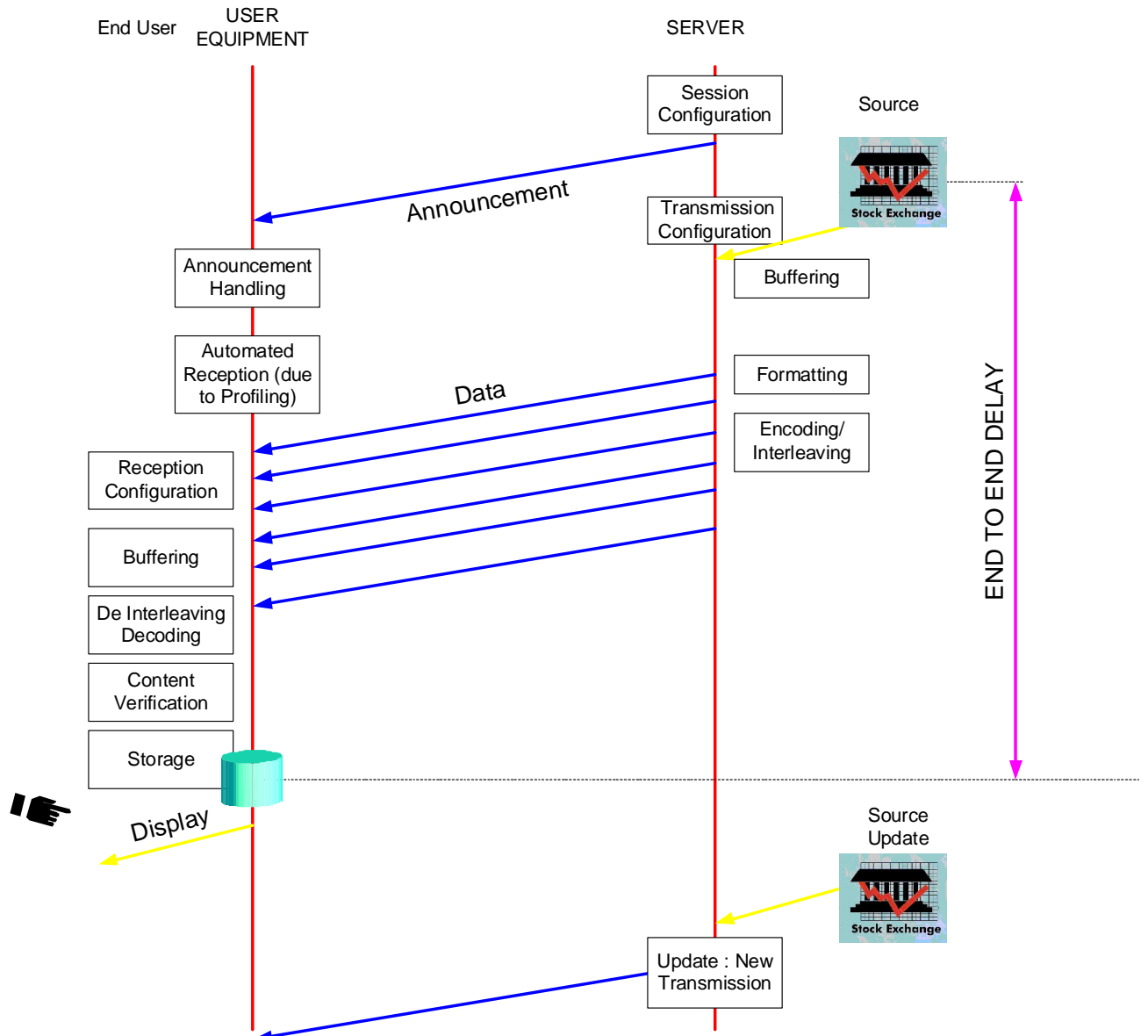


Figure 8 : Urgent (hot) download procedure sample

Reference **MAE-D6-1-C-REQ-166**

The SDMB system shall allow distribution of files, where the set of files to be distributed can change over time.

*

Reference **MAE-D6-1-C-REQ-147**

The SDMB system shall allow to assign different priorities to distribution of specific contents.

Comment: Consistency with MBMS specifications is to be checked.

*

Reference **MAE-D6-1-C-REQ-109**

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).

*

Reference **MAE-D6-1-C-REQ-020**

The relevant contents delivered via SDMB infrastructure and filtered out in the UE (see user services filtering section) shall be stored in a non volatile memory.

*

Reference **MAE-D6-1-C-REQ-030**

The end user shall be able to partition the UE non volatile memory according to his/her service usage, e.g. to favour the storage of some contents over some others.

[Comment: For further study](#)

*

5.3.2.3 Streaming

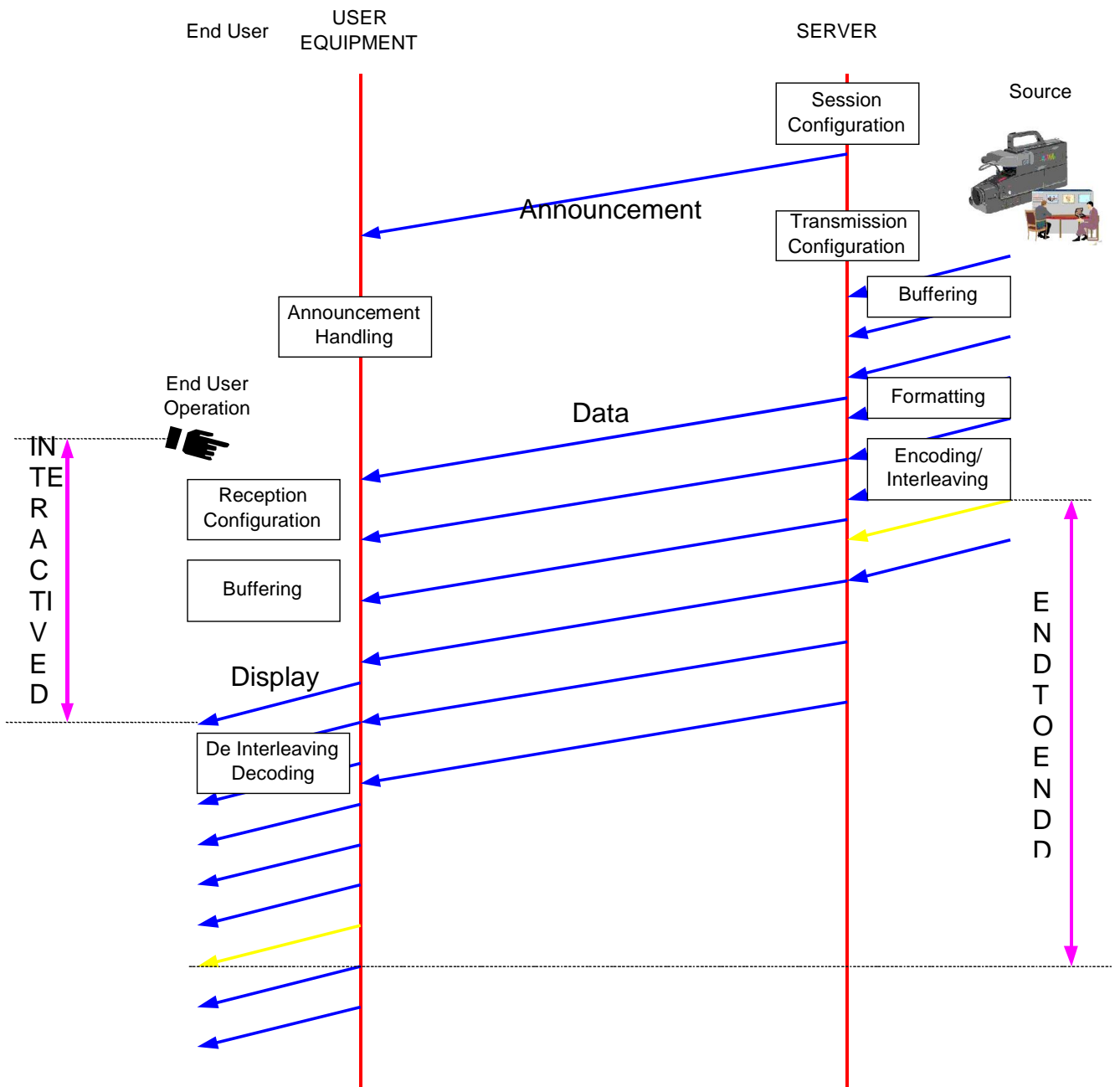


Figure 9 : Streaming

Reference MAE-D6-1-C-REQ-110

The SDMB system shall implement the streaming delivery method; the reception of the streamed data is manually activated by the end user.

Comment: The way the reception is activated is for further study

*

Reference **MAE-D6-1-C-REQ-150**

The SDMB system shall allow synchronisation of media streams consisting of several components characterised by different content type or encoding.

[Comment: For further study](#)

*

Reference **MAE-D6-1-C-REQ-152**

The SDMB system shall allow adaptive reception and adaptive rendering of media streams according to reception conditions and terminal capabilities.

[Comment: For further study](#)

*

Reference **MAE-D6-1-C-REQ-118**

Upon end user request, the UE shall be able to store the received streamed content for future use in the same conditions [although not necessarily with the same quality] than for relevant contents received through Download service, if he/she is granted corresponding rights by Digital Rights Management (DRM).

*

5.3.3 Application layer

Note: Analysis of application layer requirements is limited to service evaluation done in WP1 (no WP devoted to application layer in Maestro)

5.3.3.1 Groupcast

Reference **MAE-D6-1-C-REQ-163**

The SDMB system shall allow to define groups of UEs eligible to groupcast service.

[Comment: To be further analysed in WP1](#)

*

Reference **MAE-D6-1-C-REQ-022**

The SDMB system shall be able to get data sent by a UE through the terrestrial mobile network, then to store and forward this data using Download service to a defined group of UEs.

[Comment: To be further analysed in WP1](#)

*

Reference **MAE-D6-1-C-REQ-101**

The SDMB system shall be able to get data sent by a UE through the terrestrial mobile network, and to forward simultaneously this data using Streaming service to a defined group of UEs.

[Comment: To be further analysed in WP1](#)

*

5.3.3.2 Emergency announcement

Reference **MAE-D6-1-C-REQ-018**

Any end user under the service area having activated SDMB service shall be alerted with emergency announcements transmitted by SDMB infrastructure. The reception may be delayed (using announcement repetition) for users making use of mobile terrestrial network (voice call, data transfer, messaging) at the time of announcement, depending on UE capabilities.

*

Reference **MAE-D6-1-C-REQ-105**

Processing of Emergency announcements shall not have any impact on terrestrial mobile network operations; conversely, impacts on other SDMB services delivery is authorised.

*

5.3.3.3 Localised distribution services

Reference **MAE-D6-1-C-REQ-042**

The SDMB system shall be able to provide localised distribution services, i.e. to distribute data to a group of end users in a specific area, subset of a spot area. The distribution is supposed to be done toward the complete spot whereas each UE filters out the user services against its own location.

[Comment: For further study](#)

*

5.3.3.4 applications enabling technologies

Reference **MAE-D6-1-C-REQ-159**

The SDMB system shall support mobile broadcast applications enabling technologies defined in Open Mobile Alliance (OMA) that do not require a real-time interactivity.

[Comment: For further study](#)

*

5.3.3.5 User service filtering

Reference **MAE-D6-1-C-REQ-024**

The UE shall allow to define the user services that will be filtered out by the UE.

[Comment: For further study](#)

*

Examples of user services are weather forecast/England, sports/golf, economy, etc.

Reference **MAE-D6-1-C-REQ-027**

The user preference profile stored in the UE shall give a value representative of the level of interest of the end user for each user service.

[Comment: For further study](#)

*

Reference **MAE-D6-1-C-REQ-111**

The user preference profile initialisation shall be configurable.

[Comment: For further study](#)

*

Reference **MAE-D6-1-C-REQ-149**

The SDMB system shall allow the distribution and exploitation of an Electronic Service Guide(ESG).

[Comment: For further study](#)

*

5.3.3.6 Content selection

Reference **MAE-D6-1-C-REQ-100**

The UE shall allow to display the list of stored contents to the end user. "Stored contents" are either contents that are 100% stored in the UE, or contents that are not completely stored but could be completed by the procedure described in [MAE-D6-1-C-REQ-036].

*

Reference **MAE-D6-1-C-REQ-099**

The UE shall allow to display the list of contents transmitted by SDMB (but not necessarily stored in the UE) for user selection.

[Comment: For further study](#)

*

Reference **MAE-D6-1-C-REQ-036**

In case the end user selects an incomplete or un-stored content, the UE shall fetch the selected content missing blocks using p-t-p session established via the terrestrial mobile network. The p-t-p session establishment shall be authorised (or not) by the operator according to its policy, taking into account factors such as the end user contract & the billing type.

[Comment: For further study](#)

*

5.3.4 Transport layer

Reference **MAE-D6-1-C-REQ-033**

In order to improve the reliability of the distribution, the SDMB System 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.

Reference **MAE-D6-1-C-REQ-034**

The Reliable transport function 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 & contents to be carried.

*

Reference **MAE-D6-1-C-REQ-098**

The Reliable transport function shall implement a content protection via content repetition (carrousel).

*

Reference **MAE-D6-1-C-REQ-038**

The overhead required on the SDMB link for data protection shall be balanced with the proportion of content to be sent in terrestrial p-t-p, considering that the price of sending a given volume of data through the SDMB infrastructure is equivalent to that of sending this data to 5% [TBC] of the end users in the service coverage using terrestrial p-t-p.

*

Reference **MAE-D6-1-C-REQ-039**

The Reliable transport function shall be configurable in function of the service type and required QoS, including the likelihood for the correct content reception.

*

5.3.5 Network layer

Reference **MAE-D6-1-C-REQ-040**

The SDMB system shall provide means to distribute information to all the end users located in a Spot area.

*

Reference **MAE-D6-1-C-REQ-041**

The SDMB system shall provide means to distribute protected information only to those end users that have subscribed to the service.

*

5.3.6 Access layer

Reference **MAE-D6-1-C-REQ-004**

The SDMB system shall provide a satellite based MBMS broadcast bearer service without real-time return link over umbrella cells.

*

Reference **MAE-D6-1-C-REQ-043**

It shall be possible to modify the number and capacity of the transport/logical channels per spot area.

*

Reference **MAE-D6-1-C-REQ-045**

The SDMB infrastructure shall provide background as well as streaming traffic class capabilities.

*

Reference **MAE-D6-1-C-REQ-046**

The user service filtering function shall control the Physical layer (use of MBMS notification mechanism) to save UE power consumption.

Comment: For further study

*

5.3.7 Physical layer

Reference **MAE-D6-1-C-REQ-071**

The SDMB system shall allow deployment of two types of terrestrial repeaters in order to increase SDMB service coverage in areas subject to high blocking:

- Frequency conversion repeaters
- On-channel repeaters

*

Reference **MAE-D6-1-C-REQ-047**

The SDMB system feeder uplink shall operate in the following FSS frequency band: 27.5 - 30 GHz.

*

Reference **MAE-D6-1-C-REQ-048**

The SDMB system service downlink to UE shall operate in the following IMT 2000 frequency bands allocated to MSS: 2.17 - 2.2 GHz.

Comment: Implementation issues in the UE for further study

*

Reference **MAE-D6-1-C-REQ-049**

The SDMB system Service downlink to terrestrial repeaters shall operate in the following frequency bands:

- 19.7 - 20.2 GHz - HDFSS bands for frequency conversion repeaters
- IMT2000 MSS bands for on-channel repeaters

*

Reference **MAE-D6-1-C-REQ-050**

The SDMB system shall provide 3GPP standardised UTRA FDD W-CDMA carriers between the SDMB hub and the UE via the SDMB satellite.

*

Reference **MAE-D6-1-C-REQ-051**

The terrestrial repeaters shall transmit the same signal as the one transmitted by the satellite in the spot area where the terrestrial repeater is located, taking into account that both signals shall be received synchronously by the UE.

*

Reference **MAE-D6-1-C-REQ-052**

The UE shall be able to combine the signals coming from the satellite and the terrestrial repeaters.

*

5.3.8 User Equipment functional profile

Reference **MAE-D6-1-C-REQ-148**

The SDMB system shall not assume the UE to be always switched on, or the SDMB service permanently activated in the UE.

*

Reference **MAE-D6-1-C-REQ-088**

The functions and performances of the SDMB system shall be compatible with an UE implementing a unique reception chain for UMTS and SDMB signal reception.

*

5.3.9 Charging and billing function

Reference **MAE-D6-1-C-REQ-156**

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

*

Reference **MAE-D6-1-C-REQ-112**

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

Comment: Whether this includes or not charging mechanisms related to QoS (for example according to bandwidth or delay performance) is to be further defined

*

Reference **MAE-D6-1-C-REQ-165**

The SDMB system shall be flexible enough to cope with different business actor scenarios in different spot areas.

*

Reference **MAE-D6-1-C-REQ-107**

The operational system shall be able to charge for the terrestrial mobile network usage.

*

Reference **MAE-D6-1-C-REQ-108**

The operational system shall be able to charge for the satellite capacity usage.

*

Reference **MAE-D6-1-C-REQ-131**

The operational system shall be able to generate accounting records for content provider transmitted data.

*

Reference **MAE-D6-1-C-REQ-146**

The operational system shall allow to exchange data for charging with home and visited networks.

*

5.3.10 System resources sharing

Reference **MAE-D6-1-C-REQ-054**

The SDMB system shall allow the distribution of services and contents from different Service/content providers thus allowing them to share the same SDMB radio resources and services over the same area according to their respective SLA.

*

Reference **MAE-D6-1-C-REQ-053**

The SDMB system shall provide the means for several Mobile Network Operators to share the SDMB radio resources and services over the same area according to their respective SLA.

*

The subscription to the SDMB service can be distinct from the subscription to the mobile operator, function of business actor scenario.

Reference **MAE-D6-1-C-REQ-123**

It shall be possible to provide the SDMB services only to end users who have subscribed to identified Mobile Network Operators.

*

Reference **MAE-D6-1-C-REQ-157**

The SDMB system shall allow visiting end users to access free-to-air services and to subscribe to SDMB services.

*

5.4 PERFORMANCE REQUIREMENTS

Note: alignment of performance requirements on MBMS where applicable is for further study.

5.4.1 Service and application

Unless otherwise stated, performances described in this section are applicable to end users in the percentage of service area defined in the capacity requirements section.

Reference **MAE-D6-1-C-REQ-055**

The SDMB system shall offer two delay performances to be selected for the Download service: one for Batch (cold) contents and the other one for urgent (hot) contents.

[Comment: Smooth transition from cold to hot contents is for further study.](#)

*

Reference **MAE-D6-1-C-REQ-115**

Batch (cold) contents shall be transmitted in less than 10[TBC] hours; this delay has to be understood as the time between the beginning of the content first transmission at the server side and the availability of the downloaded data (hence after end of the last carrouseling transmission) on the UE side.

*

Reference **MAE-D6-1-C-REQ-114**

Urgent (hot) contents shall be transmitted in less than 5 [TBC] minutes; this delay has to be understood as the time between the beginning of the content transmission at the server side and the availability of the downloaded data on the UE side.

[Comment: The consequence of this performance requirement is that hot contents are limited in size. Indeed, urgent contents that are too big to be sent in hot download mode are expected to be sent using streaming.](#)

*

Reference **MAE-D6-1-C-REQ-056**

The SDMB system shall ensure that streaming contents shall be transferred in less than one minute. The lag should be computed between the BM-SC external interface and the UE experiencing the worst delay.

[Comment: To be further analysed in WP5](#)

*

Reference **MAE-D6-1-C-REQ-127**

The access time to streaming from an end user point of view (i.e. from the selection of the stream channel to the start of audio or video display) shall be less than 5 [TBC] seconds.

[Comment: To be further analysed in WP1/WP5; should be rephrased to be independent of data format \(e.g. MPEG4 decoding time\).](#)

*

Reference **MAE-D6-1-C-REQ-067**

The SDMB system shall be able to prioritise emergency announcements, ensuring that information are available to the end users in a TBD delay.

*

Reference **MAE-D6-1-C-REQ-126**

The SDMB system shall be able to provide simultaneously in the same spot area several services with possibly different performance requirements.

[Comment: Number of simultaneous services and performances is for further study.](#)

*

5.4.2 Transport layer

Reference **MAE-D6-1-C-REQ-057**

The Transport layer shall be able to correct the terrestrial network activity in idle mode interrupting the SDMB signal reception, including but not limited to paging, cell selection & meas-

urement reporting and measurements of current and adjacent cells, up to 6 GSM cells and 6 UMTS cells simultaneously.

*

Reference **MAE-D6-1-C-REQ-058**

The Transport layer shall be able to correct the BLER as defined as Physical layer performance target in order to obtain a BER less than or equal to $10E-7$ at the transport layer Service Access Point.

[Comment: To be further analysed in WP5; particularly, different error rate might be defined for streaming and download delivery methods.](#)

*

Reference **MAE-D6-1-C-REQ-059**

The Transport layer carrouseling shall be able to correct the SDMB signal reception interruptions due to cellular calls (average call duration 120s, 0.24 successful mobile terminated call attempts + 0.279 successful mobile originated call attempts) and phone switched off/service deactivation periods (average duration [TBD], frequency and distribution TBD).

[Comment: To be further analysed in WP5](#)

*

5.4.3 Network layer

For further study. Network layer performance should include bit rate, packet loss ratio, packet error ratio, delay and delay variation, with possible variations function of service.

5.4.4 Access layer

For further study

5.4.5 Physical layer

5.4.5.1 Link to User Equipment

Reference **MAE-D6-1-C-REQ-064**

The SDMB system shall be designed to provide spot beams over at least a nation wide coverage using one or several satellites.

*

Reference **MAE-D6-1-C-REQ-103**

The dimensioning of radio link shall be such as to be able to provide a BLER less than or equal to 1% with respect to transmission impairments.

[Comment: To be further analysed in WP2](#)

This does not take into account SDMB signal reception interruption due to paging and measurements of adjacent cells, as well as interruptions due to cellular calls, phone switched off/service deactivation, etc.

*

5.4.5.2 Link to terrestrial repeaters

Reference **MAE-D6-1-C-REQ-135**

The dimensioning of the radio link used to feed the terrestrial repeaters shall be done to fit reception antennas with a greatest dimension smaller than or equal to 0.30 meters.

*

The next requirement is meaningful only for frequency conversion repeaters (no rain attenuation in MSS band).

Reference **MAE-D6-1-C-REQ-144**

The dimensioning of the radio link used to feed the terrestrial repeaters shall be done to ensure a Hub-terrestrial repeater link availability Vs rain attenuation of at least 99.5% [99.9% as a goal TBC] over a year under the defined coverage.

*

Reference **MAE-D6-1-C-REQ-141**

The terrestrial repeaters deployment shall be minimised, and in any case, the number of terrestrial repeaters, resp. sectors in an area shall be inferior or equal to the number of Node B/sectors of a deployed T-UMTS network offering comparable radio coverage.

*

5.4.6 Cross-layer performances

Reference **MAE-D6-1-C-REQ-062**

The activation of SDMB service delivery shall not impact the SDMB enabled handset autonomy in typical 3G communication/standby mode profile by more than 30% for 1 [TBC] hour of data filtered out per day, at the maximum specified data rate, and whether the data are stored or immediately displayed.

[Comment: For further study](#)

*

Reference **MAE-D6-1-C-REQ-065**

The SDMB services shall be available in the same mobility conditions that typical 3G cellular handset are designed to support for point to point services. This includes pedestrian and vehicular mobility profiles.

*

5.4.7 User Equipment performance profile

The performances of the SDMB system are depending on the User Equipment performances. Nevertheless, a typical set of User Equipment performances is needed to design the SDMB system and to assess its typical performances.

Reference **MAE-D6-1-C-REQ-136**

The SDMB system performances as defined in this document shall be met for the following UE profile:

- Noise figure: 9 dB or better
- Rake size: 20 us or better

- Rake fingers: 6 or better
- TTI: 80 ms at 384 kbps

*

5.5 CAPACITY REQUIREMENTS

Reference **MAE-D6-1-C-REQ-066**

In urban environment (both terrestrial repeaters and T-UMTS networks are deployed), the SDMB system shall have the capability to provide 2x384 kbps at RLC SAP level, per 5 MHz bandwidth per spot over 95% of the outdoor service area.

[Comment: To be further analysed in WP2](#)

*

Reference **MAE-D6-1-C-REQ-137**

In urban environment (both terrestrial repeaters and T-UMTS networks are deployed), the SDMB system shall have the capability to provide 2x384 kbps at RLC SAP level, per 5 MHz bandwidth per spot over 95% [TBC] of the indoor (1st wall) service area.

[Comment: To be further analysed in WP2](#)

*

Reference **MAE-D6-1-C-REQ-138**

In rural environment (neither Terrestrial repeaters, nor T-UMTS networks are deployed), the SDMB system shall have the capability to provide 2x384 kbps at RLC SAP level, per 5 MHz bandwidth per spot over 95% [TBC] of the outdoor service area.

[Comment: To be further analysed in WP2](#)

*

Reference **MAE-D6-1-C-REQ-061**

In rural environment (neither Terrestrial repeaters, nor T-UMTS networks are deployed), the SDMB system shall have the capability to provide 2x384 kbps at RLC SAP level, per 5 MHz bandwidth per spot over 70% [TBC] of the indoor (1st wall) service area.

[Comment: To be further analysed in WP2](#)

*

Reference **MAE-D6-1-C-REQ-116**

The UE shall have the capability to decode and store at least 384 kbps at RLC SAP level.

[Comment: To be reworded according to MBMS standard](#)

*

Filings for SDMB system in Europe have been registered at ITU for the orbital slots 15°W, 10°E and 32.5°E.

Reference **MAE-D6-1-C-REQ-158**

The nominal performances of the SDMB system [as defined in this document] are to be reached for an arbitrary selected orbital position at 10°E.

*

Reference **MAE-D6-1-C-REQ-072**

The SDMB system shall be designed to provide a service area over a part of the European continent, namely between (1) Latitude: 35°N and 65°N; (2) Longitude: 10°W and 30°E.

*

Since this issue is still open, the possible nation-wide/linguistic spot beams according to market expectations are :

- Spain/Portugal,
- Italy,
- France, Belgium and Luxembourg,
- UK and Ireland,
- Germany, Switzerland, Austria and Netherlands
- and Greece.

5.6 SECURITY REQUIREMENTS

5.6.1 Content provider related security

Reference **MAE-D6-1-C-REQ-129**

The SDMB system shall be able to authenticate third party content providers that provide content for SDMB transmissions.

*

Reference **MAE-D6-1-C-REQ-130**

The SDMB system shall be able to verify the integrity of data received from content providers.

*

Reference **MAE-D6-1-C-REQ-164**

The SDMB system shall allow the content providers to mark contents with DRM (e.g. content forwarding, number of accesses) according to their policy.

*

5.6.2 User related security

Reference **MAE-D6-1-C-REQ-132**

The operational system may be required to authenticate the end user before allowing access to SDMB services

[Comment: To be further analysed in WP4](#)

*

Reference **MAE-D6-1-C-REQ-133**

The operational system may be required to authorise access to SDMB services based upon the geographical location of the UE.

[Comment: Opportunity to be assessed in WP1](#)

*

Reference **MAE-D6-1-C-REQ-075**

The operational system shall implement access control to distribute multimedia content.

*

Reference **MAE-D6-1-C-REQ-073**

The end user shall be able to forward contents to another end user, e.g. via the terrestrial mobile network if he/she is granted rights by DRM.

*

Reference **MAE-D6-1-C-REQ-117**

The UE shall forbid transmission of personal data without user agreement.

*

5.7 REGULATIONS REQUIREMENTS

Reference **MAE-D6-1-C-REQ-076**

The SDMB system shall be capable of providing an equitable access to its capacity to any mobile operator requesting to use the SDMB broadcast capacity.

*

Reference **MAE-D6-1-C-REQ-077**

In order to avoid detrimental interference to terrestrial mobile systems, the Terrestrial Repeaters shall comply with the same power limits and spectrum emission masks than Terrestrial FDD base stations, as described in 3GPP 25.104.

*

Reference **MAE-D6-1-C-REQ-078**

In order to avoid detrimental interference to terrestrial mobile systems, the aggregate power of the SDMB satellite(s) emissions shall not create an interference level at the UE, respectively BS, receiver in excess of 3% (TBC) of the UE, respectively BS, thermal noise level in any of the terrestrial UTRA FDD/TDD carriers.

*

Reference **MAE-D6-1-C-REQ-079**

In order to avoid detrimental interference to MSS systems operating in adjacent bands, the aggregate power of the SDMB satellite segment shall not exceed a power flux density of -143.7 dBW/m²/25 kHz (TBC) in the band 2187.5-2200 MHz (TBC), at any location.

*

Reference **MAE-D6-1-C-REQ-080**

In order to avoid detrimental interference to Terrestrial networks operating in the band 2170-2200 MHz, the aggregate power of the SDMB satellite segment shall not exceed a power flux density of:

- 128 dBW/m²/MHz for elevation $\leq 5^\circ$
- 128 + 0.5*(el - 5) for $5^\circ < \text{elevation} \leq 25^\circ$
- 118 dBW/m²/MHz for elevation $> 25^\circ$

over the territory of the following countries: Jordan, Turkey, Syria, Egypt, Canada, Cuba (this list is TBC). Potential coordination agreement with these countries may result in less stringent pfd limits.

*

5.8 Reliability, Availability, Maintainability & Safety REQUIREMENTS

5.8.1 Reliability

For further study

5.8.2 Availability and Continuity

Reference **MAE-D6-1-C-REQ-081**

The system shall be able to provide a nominal service during 99,5% [TBC] of time over one calendar month.

*

Reference **MAE-D6-1-C-REQ-125**

The maximum outage duration shall be less than 2 hours [TBC].

*

5.8.3 Maintainability

For further study

5.8.4 Safety of means and people

5.8.4.1 Functions Safety requirements

For further study

5.8.4.2 Equipment Human Safety requirements.

For further study

5.9 ENVIRONMENT REQUIREMENTS

5.9.1 Mechanical Interface Requirements

Not applicable at system level.

5.9.2 Environmental Constraints

5.9.2.1 Mechanical environment

Not applicable at system level.

5.9.2.2 Natural environment

Not applicable at system level.

5.9.2.3 Radiation environment

Not applicable at system level.

5.9.3 Power Supply Requirements

Not applicable at system level.

5.10 DESIGN AND DEVELOPMENT REQUIREMENTS

5.10.1 Architecture

5.10.1.1 Terminal

Reference **MAE-D6-1-C-REQ-082**

The UE shall be either a SDMB enabled 3G handset, a nomadic terminal embedded in a laptop or a nomadic terminal installed on board a vehicle.

*

Reference **MAE-D6-1-C-REQ-083**

The implementation of SDMB features in 3GPP standardised handset shall not modify the UE form factor (mass, aesthetic and/or volume, [TBC for volume]).

*

Reference **MAE-D6-1-C-REQ-085**

The UE shall be 3GPP MBMS compliant operating in the IMT2000 core band with extended frequency agility in the IMT2000 band allocated to Mobile Satellite System, namely 2170-2200 MHz.

*

Reference **MAE-D6-1-C-REQ-086**

The UE shall have a radio sensitivity level similar or better than - 117 dBm as defined in 3GPP TS 25.101.

*

Reference **MAE-D6-1-C-REQ-032**

The UE shall allow the portability of SDMB services between different UE owned by the end user, including but not limited to the ability to transfer the stored content, keys associated with subscribed services as well as user preference profile from one UE to another.

[Comment: For further study](#)

*

Reference **MAE-D6-1-C-REQ-069**

The UE should implement a local storage capacity for SDMB contents of at least 256 Mbytes.

*

5.10.1.2 Terrestrial repeaters

Reference **MAE-D6-1-C-REQ-089**

The terrestrial repeaters shall be designed for possible co-siting with existing terrestrial mobile network base stations to prevent the need to set up additional radio sites.

*

Reference **MAE-D6-1-C-REQ-104**

The terrestrial repeaters shall be designed for possible independent installation.

*

Reference **MAE-D6-1-C-REQ-168**

The terrestrial repeaters shall be designed for possible 3GPP radio interface evolution, keeping the same 5MHz channelisation mode.

*

Reference **MAE-D6-1-C-REQ-169**

It shall be possible to configure the terrestrial repeaters output frequency in the whole IMT 2000 MSS band plus (terrestrial) UMTS band.

*

Reference **MAE-D6-1-C-REQ-170**

The terrestrial repeaters shall be able to distribute up to three 5 MHz multiplexes in the same cell.

*

5.10.1.3 Satellite

Reference **MAE-D6-1-C-REQ-142**

The satellite configuration shall be flexible in terms of number of active beams and power sharing between active beams.

*

Reference **MAE-D6-1-C-REQ-143**

The satellite shall be designed for possible 3GPP radio interface evolution, keeping the same 5MHz channelisation mode.

*

Reference **MAE-D6-1-C-REQ-167**

It shall be possible to configure the space segment to distribute up to three 5 MHz multiplexes in the same spot.

*

5.10.1.4 Hub

For further study

5.10.1.5 Service center

For further study

5.10.2 Interfaces

Reference **MAE-D6-1-C-REQ-092**

From a functional point of view, the SDMB System shall be agnostic with respect to stream type / stream encoding and file type / file encoding.

Comment: End-to-end performances are obviously dependant of stream type / stream encoding and file type / file encoding.

*

5.10.3 Reusability

For further study

5.10.4 S/W technologies and processes

Not applicable at system level.

5.10.5 Particular instructions for materials and procedures

Not applicable at system level.

5.10.6 Robustness

Not applicable at system level.

5.10.7 Efficiency margins

For further study

5.10.8 Expansion capability - Potential for additional services

For further study

5.10.9 Portability

For further study

5.10.10 Mechanical design

Not applicable at system level.

5.10.11 Electrical design

Not applicable at system level.

5.10.12 Thermal design

Not applicable at system level.

5.10.13 Production

Reference **MAE-D6-1-C-REQ-093**

The SDMB system shall be able to support multi-vendor terrestrial repeaters.

*

Reference **MAE-D6-1-C-REQ-094**

The SDMB system shall be able to support multi-vendor UE.

*

5.11 INTEGRATED LOGISTIC SUPPORT REQUIREMENTS

5.11.1 Test and trouble-shooting support equipment

For further study

5.11.2 Deployment configuration requirements

For further study

5.11.3 Databases

For further study

5.11.4 Packaging, handling, storage and transport

For further study

5.11.5 Identification and labelling

For further study

5.12 RESULT ASSURANCE REQUIREMENTS

5.12.1 Requirements relating to the qualification of the system

For further study

5.12.2 Requirements relating to the acceptance conditions of the system

For further study

5.12.3 Requirements relating to the verification of the system

For further study

5.12.4 Strategy relating to the validation of the system

For further study

6 APPLICABILITY OF THE COMMERCIAL SYSTEM REQUIREMENTS TO THE TEST BED R2

The aim of this section is to review each Commercial Product requirements of the chapter 5, to indicate its applicability in the scope of the test bed R2 :

- A stands for "fully Applicable",
- PA stands for "Partially Applicable",
- NA stands for "Not Applicable",

<i>PUID</i>	<i>§ N°</i>	<i>Requirements Specification</i>	<i>MAE TBR2 App.</i>	<i>MAE TBR2 Justification</i>
	§5	5 COMMERCIAL PRODUCT REQUIREMENTS		
	§5.1	5.1 EXTERNAL INTERFACE REQUIREMENTS		
[MAE-D6-1-C-REQ-001]	§5.1	The SDMB system shall be able to interconnect to 3G packets networks via standard interfaces.	NA	
[MAE-D6-1-C-REQ-002]	§5.1	The SDMB system shall be able to interconnect to 2G packets networks via standard interfaces.	PA	GPRS network will be used for interactive link.
[MAE-D6-1-C-REQ-128]	§5.1	The SDMB system shall be able to interconnect to content providers via standard interfaces.	NA	
	§5.2	5.2 OPERATIONAL REQUIREMENTS		
	§5.2.2	5.2.2 Operability		
	§5.2.2.1	5.2.2.1 General requirements for operability		
[MAE-D6-1-C-REQ-161]	§5.2.2.1	The SDMB system shall provide each actor with the means to monitor the components he operates.	PA	The test-bed components will be monitored.
	§5.2.2.3	5.2.2.3 Observability and Monitoring		
[MAE-D6-1-C-REQ-005]	§5.2.2.3	The UE shall be able to indicate the SDMB services available on user demand.	PA	OK with a single service.
[MAE-D6-1-C-REQ-006]	§5.2.2.3	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.	PA	The UE shall be able to keep track of the received data rate
[MAE-D6-1-C-REQ-007]	§5.2.2.3	The operational system shall provide the means to collect service usage measurements from the UE using standard terrestrial p-t-p connection and to analyse this data for statistical purposes.	NA	
[MAE-D6-1-C-REQ-008]	§5.2.2.3	The terrestrial repeaters shall be monitored and controlled in a centralised way, by their operator.	NA	
[MAE-D6-1-C-REQ-106]	§5.2.2.3	The operational system shall be able to monitor the coverage over service area provided by the Space segment.	NA	
	§5.2.3	5.2.3 Operation scenarios		

<i>PUID</i>	<i>§ N°</i>	<i>Requirements Specification</i>	<i>MAE TBR2 App.</i>	<i>MAE TBR2 Justification</i>
	§5.2.3.1	5.2.3.1 Transmission media selection		
[MAE-D6-1-C-REQ-010]	§5.2.3.1	The operational system shall implement features enabling to select a distribution link between the SDMB and terrestrial mobile network according to criteria such as targeted audience, content size, required QoS and terrestrial network capacities in terms of MBMS.	PA	.
[MAE-D6-1-C-REQ-119]	§5.2.3.1	The QoS parameters shall include traffic type (real time vs background selection), transfer delay characteristics, probability of delivery success, bandwidth and jitter.	NA	
	§5.2.3.2	5.2.3.2 Access to services and contents		
[MAE-D6-1-C-REQ-011]	§5.2.3.2	The operational system shall allow the end user to subscribe to the SDMB service using a ptp terrestrial connection.	NA	
[MAE-D6-1-C-REQ-012]	§5.2.3.2	The operational system shall allow the end user to activate/de-activate the reception of a subscribed SDMB service.	NA	
[MAE-D6-1-C-REQ-014]	§5.2.3.2	Assuming the UE to be attached to its home mobile network or to a roaming partner network, the operational system shall be able to provide contents to the UE via any terrestrial mobile network coverage, but not necessarily with the same QoS, on UE demand.	NA	
[MAE-D6-1-C-REQ-162]	§5.2.3.2	The SDMB system shall allow to protect services and contents by Digital Rights Management (DRM).	NA	
	§5.2.3.3	5.2.3.3 Cohabitation with 2G-3G operations		
[MAE-D6-1-C-REQ-003]	§5.2.3.3	The SDMB system operation shall not impact operations of UE attached to mobile networks including but not limited to paging, location update, cells monitoring, measurements, calls.	PA	It shall be possible to receive SDMB data while processing basic signalling on the 2G network.
[MAE-D6-1-C-REQ-016]	§5.2.3.3	The UE shall notify the end user of incoming cellular calls or messaging whatever the SDMB service reception being active.	A	
[MAE-D6-1-C-REQ-015]	§5.2.3.3	The UE shall be able to establish a p-t-p session (voice call, data transfer, messaging) or p-t-m session on terrestrial mobile network although the SDMB service is activated; in this case the SDMB service reception may be interrupted for the duration of the p-t-p session depending on UE capabilities.	PA	
	§5.3	5.3 FUNCTIONAL REQUIREMENTS		
	§5.3.2	5.3.2 Delivery methods		
	§5.3.2.1	5.3.2.1 Delivery methods types		
[MAE-D6-1-C-REQ-019]	§5.3.2.1	The SDMB system shall provide point to multipoint services using Download and Streaming delivery methods.	A	
	§5.3.2.2	5.3.2.2 Download		

<i>PUID</i>	<i>§ N°</i>	<i>Requirements Specification</i>	<i>MAE TBR2 App.</i>	<i>MAE TBR2 Justification</i>
[MAE-D6-1-C-REQ-155]	§5.3.2.2	The SDMB system shall allow distribution of files, one or several times.	A	
[MAE-D6-1-C-REQ-166]	§5.3.2.2	The SDMB system shall allow distribution of files, where the set of files to be distributed can change over time.	NA	
[MAE-D6-1-C-REQ-147]	§5.3.2.2	The SDMB system shall allow to assign different priorities to distribution of specific contents.	NA	
[MAE-D6-1-C-REQ-109]	§5.3.2.2	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).	PA	Any content stored on the UE will be accessible to the end user; DRM are not handled.
[MAE-D6-1-C-REQ-020]	§5.3.2.2	The relevant contents delivered via SDMB infrastructure and filtered out in the UE (see user services filtering section) shall be stored in a non volatile memory.	PA	The filtering will be very simplified since the UE will only be able to differentiate "streaming contents" from "download contents". In both cases, contents can be stored.
[MAE-D6-1-C-REQ-030]	§5.3.2.2	The end user shall be able to partition the UE non volatile memory according to his/her service usage, e.g. to favour the storage of some contents over some others.	NA	
	§5.3.2.3	5.3.2.3 Streaming		
[MAE-D6-1-C-REQ-110]	§5.3.2.3	The SDMB system shall implement the streaming delivery method; the reception of the streamed data is manually activated by the end user.	A	
[MAE-D6-1-C-REQ-150]	§5.3.2.3	The SDMB system shall allow synchronisation of media streams consisting of several components characterised by different content type or encoding.	NA	
[MAE-D6-1-C-REQ-152]	§5.3.2.3	The SDMB system shall allow adaptive reception and adaptive rendering of media streams according to reception conditions and terminal capabilities.	NA	
[MAE-D6-1-C-REQ-118]	§5.3.2.3	Upon end user request, the UE shall be able to store the received streamed content for future use in the same conditions [although not necessarily with the same quality] than for relevant contents received through Download service, if he/she is granted corresponding rights by Digital Rights Management (DRM).	PA	It shall be possible to store streamed content. Neither forwarding, nor DRM are handled.
	§5.3.3	5.3.3 Application layer		
	§5.3.3.1	5.3.3.1 Groupcast		
[MAE-D6-1-C-REQ-163]	§5.3.3.1	The SDMB system shall allow to define groups of UEs eligible to groupcast service.	NA	
[MAE-D6-1-C-REQ-022]	§5.3.3.1	The SDMB system shall be able to get data sent by a UE through the terrestrial mobile network, then to store and forward this data using Download service to a defined group of UEs.	NA	

<i>PUID</i>	<i>§ N°</i>	<i>Requirements Specification</i>	<i>MAE TBR2 App.</i>	<i>MAE TBR2 Justification</i>
[MAE-D6-1-C-REQ-101]	§5.3.3.1	The SDMB system shall be able to get data sent by a UE through the terrestrial mobile network, and to forward simultaneously this data using Streaming service to a defined group of UEs.	NA	
	§5.3.3.2	5.3.3.2 Emergency announcement		
[MAE-D6-1-C-REQ-018]	§5.3.3.2	Any end user under the service area having activated SDMB service shall be alerted with emergency announcements transmitted by SDMB infrastructure. The reception may be delayed (using announcement repetition) for users making use of mobile terrestrial network (voice call, data transfer, messaging) at the time of announcement, depending on UE capabilities.	NA	
[MAE-D6-1-C-REQ-105]	§5.3.3.2	Processing of Emergency announcements shall not have any impact on terrestrial mobile network operations; conversely, impacts on other SDMB services delivery is authorised.	NA	
	§5.3.3.3	5.3.3.3 Localised distribution services		
[MAE-D6-1-C-REQ-042]	§5.3.3.3	The SDMB system shall be able to provide localised distribution services, i.e. to distribute data to a group of end users in a specific area, subset of a spot area. The distribution is supposed to be done toward the complete spot whereas each UE filters out the user services against its own location.	NA	
[MAE-D6-1-C-REQ-159]	§5.3.3.4	The SDMB system shall support mobile broadcast applications enabling technologies defined in Open Mobile Alliance (OMA) that do not require a real-time interactivity.	NA	
	§5.3.3.5	5.3.3.5 User service filtering		
[MAE-D6-1-C-REQ-024]	§5.3.3.5	The UE shall allow to define the user services that will be filtered out by the UE.	NA	
[MAE-D6-1-C-REQ-027]	§5.3.3.5	The user preference profile stored in the UE shall give a value representative of the level of interest of the end user for each user service.	NA	
[MAE-D6-1-C-REQ-111]	§5.3.3.5	The user preference profile initialisation shall be configurable.	NA	
[MAE-D6-1-C-REQ-149]	§5.3.3.5	The SDMB system shall allow the distribution and exploitation of an Electronic Service Guide(ESG).	NA	
	§5.3.3.6	5.3.3.6 Content selection		
[MAE-D6-1-C-REQ-100]	§5.3.3.6	The UE shall allow to display the list of stored contents to the end user. "Stored contents" are either contents that are 100% stored in the UE, or contents that are not completely stored but could be completed by the procedure described in [MAE-D6-1-C-REQ-036].	A	
[MAE-D6-1-C-REQ-099]	§5.3.3.6	The UE shall allow to display the list of contents transmitted by SDMB (but not necessarily stored in the UE) for user selection.	NA	

<i>PUID</i>	<i>§ N°</i>	<i>Requirements Specification</i>	<i>MAE TBR2 App.</i>	<i>MAE TBR2 Justification</i>
[MAE-D6-1-C-REQ-036]	§5.3.3.6	In case the end user selects an incomplete or un-stored content, the UE shall fetch the selected content missing blocks using p-t-p session established via the terrestrial mobile network. The p-t-p session establishment shall be authorised (or not) by the operator according to its policy, taking into account factors such as the end user contract & the billing type.	PA	Completion of uncomplete contents could be implemented
	§5.3.4	5.3.4 Transport layer		
[MAE-D6-1-C-REQ-033]	§5.3.4	In order to improve the reliability of the distribution, the SDMB System shall implement a reliable transport function without permanent real time return link (neither satellite nor terrestrial).	A	
[MAE-D6-1-C-REQ-034]	§5.3.4	The Reliable transport function 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 & contents to be carried.	A	
[MAE-D6-1-C-REQ-098]	§5.3.4	The Reliable transport function shall implement a content protection via content repetition (carrousel).	A	
[MAE-D6-1-C-REQ-038]	§5.3.4	The overhead required on the SDMB link for data protection shall be balanced with the proportion of content to be sent in terrestrial p-t-p, considering that the price of sending a given volume of data through the SDMB infrastructure is equivalent to that of sending this data to 5% [TBC] of the end users in the service coverage using terrestrial p-t-p.	NA	
[MAE-D6-1-C-REQ-039]	§5.3.4	The Reliable transport function shall be configurable in function of the service type and required QoS, including the likelihood for the correct content reception.	PA	Several reliable transport configurations will be tested.
	§5.3.5	5.3.5 Network layer		
[MAE-D6-1-C-REQ-040]	§5.3.5	The SDMB system shall provide means to distribute information to all the end users located in a Spot area.	PA	
[MAE-D6-1-C-REQ-041]	§5.3.5	The SDMB system shall provide means to distribute protected information only to those end users that have subscribed to the service.	PA	This is possible though the PLMN
	§5.3.6	5.3.6 Access layer		
[MAE-D6-1-C-REQ-004]	§5.3.6	The SDMB system shall provide a satellite based MBMS broadcast bearer service without real-time return link over umbrella cells.	PA	The satellite will be emulated by an helix antenna to achieve circular polarisation. MBMS will not be implemented.
[MAE-D6-1-C-REQ-043]	§5.3.6	It shall be possible to modify the number and capacity of the transport/logical channels per spot area.	A	Several configurations will be tested
[MAE-D6-1-C-REQ-045]	§5.3.6	The SDMB infrastructure shall provide background as well as streaming traffic class capabilities.	NA	
[MAE-D6-1-C-REQ-046]	§5.3.6	The user service filtering function shall control the Physical layer (use of MBMS notification mechanism) to save UE power consumption.	NA	

<i>PUID</i>	<i>§ N°</i>	<i>Requirements Specification</i>	<i>MAE TBR2 App.</i>	<i>MAE TBR2 Justification</i>
	§5.3.7	5.3.7 Physical layer		
[MAE-D6-1-C-REQ-071]	§5.3.7	The SDMB system shall allow deployment of two types of terrestrial repeaters in order to increase SDMB service coverage in areas subject to high blocking: - Frequency conversion repeaters - On-channel repeaters	PA	In laboratory, the SIMSTAR shall be used to generate on-channel repeater contributions; in field, on-channel repeaters will be deployed
[MAE-D6-1-C-REQ-047]	§5.3.7	The SDMB system feeder uplink shall operate in the following FSS frequency band: 27.5 - 30 GHz.	NA	
[MAE-D6-1-C-REQ-048]	§5.3.7	The SDMB system service downlink to UE shall operate in the following IMT 2000 frequency bands allocated to MSS: 2.17 - 2.2 GHz.	PA	The frequency band used by the test-bed is the (terrestrial) UMTS one.
[MAE-D6-1-C-REQ-049]	§5.3.7	The SDMB system Service downlink to terrestrial repeaters shall operate in the following frequency bands: - 19.7 - 20.2 GHz - HDFSS bands for frequency conversion repeaters - IMT2000 MSS bands for on-channel repeaters	NA	
[MAE-D6-1-C-REQ-050]	§5.3.7	The SDMB system shall provide 3GPP standardised UTRA FDD W-CDMA carriers between the SDMB hub and the UE via the SDMB satellite.	A	
[MAE-D6-1-C-REQ-051]	§5.3.7	The terrestrial repeaters shall transmit the same signal as the one transmitted by the satellite in the spot area where the terrestrial repeater is located, taking into account that both signals shall be received synchronously by the UE.	A	Both signals shall be received within the rake window.
[MAE-D6-1-C-REQ-052]	§5.3.7	The UE shall be able to combine the signals coming from the satellite and the terrestrial repeaters.	A	
	§5.3.8	5.3.8 User Equipment functional profile		
[MAE-D6-1-C-REQ-148]	§5.3.8	The SDMB system shall not assume the UE to be always switched on, or the SDMB service permanently activated in the UE.	NA	
[MAE-D6-1-C-REQ-088]	§5.3.8	The functions and performances of the SDMB system shall be compatible with an UE implementing a unique reception chain for UMTS and SDMB signal reception.	NA	
	§5.3.9	5.3.9 Charging and billing function		
[MAE-D6-1-C-REQ-156]	§5.3.9	It shall be possible to provide free-to-air services, that do not require end-user subscription	A	Subscription process is not handled in the test-bed
[MAE-D6-1-C-REQ-112]	§5.3.9	It shall be possible to bill the SDMB services delivery based on two types of models: subscription and pay per act.	NA	
[MAE-D6-1-C-REQ-165]	§5.3.9	The SDMB system shall be flexible enough to cope with different business actor scenarios in different spot areas.	NA	

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[MAE-D6-1-C-REQ-107]	§5.3.9	The operational system shall be able to charge for the terrestrial mobile network usage.	NA	
[MAE-D6-1-C-REQ-108]	§5.3.9	The operational system shall be able to charge for the satellite capacity usage.	NA	
[MAE-D6-1-C-REQ-131]	§5.3.9	The operational system shall be able to generate accounting records for content provider transmitted data.	NA	
[MAE-D6-1-C-REQ-146]	§5.3.9	The operational system shall allow to exchange data for charging with home and visited networks.	NA	
	§5.3.10	5.3.10 System resources sharing		
[MAE-D6-1-C-REQ-054]	§5.3.10	The SDMB system shall allow the distribution of services and contents from different Service/content providers thus allowing them to share the same SDMB radio resources and services over the same area according to their respective SLA.	NA	
[MAE-D6-1-C-REQ-053]	§5.3.10	The SDMB system shall provide the means for several Mobile Network Operators to share the SDMB radio resources and services over the same area according to their respective SLA.	NA	
[MAE-D6-1-C-REQ-123]	§5.3.10	It shall be possible to provide the SDMB services only to end users who have subscribed to identified Mobile Network Operators.	A	
[MAE-D6-1-C-REQ-157]	§5.3.10	The SDMB system shall allow visiting end users to access free-to-air services and to subscribe to SDMB services.	NA	
	§5.4	5.4 PERFORMANCE REQUIREMENTS		
	§5.4.1	5.4.1 Service and application		
[MAE-D6-1-C-REQ-055]	§5.4.1	The SDMB system shall offer two delay performances to be selected for the Download service: one for Batch (cold) contents and the other one for urgent (hot) contents.	A	
[MAE-D6-1-C-REQ-115]	§5.4.1	Batch (cold) contents shall be transmitted in less than 10[TBC] hours; this delay has to be understood as the time between the beginning of the content first transmission at the server side and the availability of the downloaded data (hence after end of the last carousel transmission) on the UE side.	A	This will be tested on the test-bed
[MAE-D6-1-C-REQ-114]	§5.4.1	Urgent (hot) contents shall be transmitted in less than 5 [TBC] minutes; this delay has to be understood as the time between the beginning of the content transmission at the server side and the availability of the downloaded data on the UE side.	A	This will be tested on the test-bed
[MAE-D6-1-C-REQ-056]	§5.4.1	The SDMB system shall ensure that streaming contents shall be transferred in less than one minute. The lag should be computed between the BM-SC external interface and the UE experiencing the worst delay.	A	Contents will be always available in the service center.

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[MAE-D6-1-C-REQ-127]	§5.4.1	The access time to streaming from an end user point of view (i.e. from the selection of the stream channel to the start of audio or video display) shall be less than 5 [TBC] seconds.	A	This will be tested on the test-bed
[MAE-D6-1-C-REQ-067]	§5.4.1	The SDMB system shall be able to prioritise emergency announcements, ensuring that information are available to the end users in a TBD delay.	NA	
[MAE-D6-1-C-REQ-126]	§5.4.1	The SDMB system shall be able to provide simultaneously in the same spot area several services with possibly different performance requirements.	NA	
	§5.4.2	5.4.2 Transport layer		
[MAE-D6-1-C-REQ-057]	§5.4.2	The Transport layer shall be able to correct the terrestrial network activity in idle mode interrupting the SDMB signal reception, including but not limited to paging, cell selection & measurement reporting and measurements of current and adjacent cells, up to 6 GSM cells and 6 UMTS cells simultaneously.	PA	
[MAE-D6-1-C-REQ-058]	§5.4.2	The Transport layer shall be able to correct the BLER as defined as Physical layer performance target in order to obtain a BER less than or equal to 10E-7 at the transport layer Service Access Point.	PA	The performances of the reliable transport will be evaluated.
[MAE-D6-1-C-REQ-059]	§5.4.2	The Transport layer carrouseling shall be able to correct the SDMB signal reception interruptions due to cellular calls (average call duration 120s, 0.24 successful mobile terminated call attempts + 0.279 successful mobile originated call attempts) and phone switched off/service deactivation periods (average duration [TBD], frequency and distribution TBD).	PA	
	§5.4.5	5.4.5 Physical layer		
	§5.4.5.1	5.4.5.1 Link to User Equipment		
[MAE-D6-1-C-REQ-064]	§5.4.5.1	The SDMB system shall be designed to provide spot beams over at least a nation wide coverage using one or several satellites.	NA	
[MAE-D6-1-C-REQ-103]	§5.4.5.1	The dimensioning of radio link shall be such as to be able to provide a BLER less than or equal to 1% with respect to transmission impairments. - This does not take into account SDMB signal reception interruption due to paging and measurements of adjacent cells, as well as interruptions due to cellular calls, phone switched off/service deactivation, etc.	PA	The performances of the physical layer will be evaluated.
	§5.4.5.2	5.4.5.2 Link to terrestrial repeaters		
[MAE-D6-1-C-REQ-135]	§5.4.5.2	The dimensioning of the radio link used to feed the terrestrial repeaters shall be done to fit reception antennas with a greatest dimension smaller than or equal to 0.30 meters.	NA	
[MAE-D6-1-C-REQ-144]	§5.4.5.2	The dimensioning of the radio link used to feed the terrestrial repeaters shall be done to ensure a Hub-terrestrial repeater link availability Vs rain attenuation of at least 99.5% [99.9% as a goal TBC] over a year under the defined coverage.	NA	

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[MAE-D6-1-C-REQ-141]	§5.4.5.2	The terrestrial repeaters deployment shall be minimised, and in any case, the number of terrestrial repeaters, resp. sectors in an area shall be inferior or equal to the number of Node B/sectors of a deployed T-UMTS network offering comparable radio coverage.	NA	
	§5.4.6	5.4.6 Cross-layer performances		
[MAE-D6-1-C-REQ-062]	§5.4.6	The activation of SDMB service delivery shall not impact the SDMB enabled handset autonomy in typical 3G communication/standby mode profile by more than 30% for 1 [TBC] hour of data filtered out per day, at the maximum specified data rate, and whether the data are stored or immediately displayed.	PA	This could be measured on the test-bed
[MAE-D6-1-C-REQ-065]	§5.4.6	The SDMB services shall be available in the same mobility conditions that typical 3G cellular handset are designed to support for point to point services. This includes pedestrian and vehicular mobility profiles.	PA	The pedestrian and vehicular mobility profiles will be tested.
	§5.4.7	5.4.7 User Equipment performance profile		
[MAE-D6-1-C-REQ-136]	§5.4.7	The SDMB system performances as defined in this document shall be met for the following UE profile: - Noise figure: 9 dB or better - Rake size: 20 us or better - Rake fingers: 6 or better - TTI: 80 ms at 384 kbps	NA	
	§5.5	5.5 CAPACITY REQUIREMENTS		
[MAE-D6-1-C-REQ-066]	§5.5	In urban environment (both terrestrial repeaters and T-UMTS networks are deployed), the SDMB system shall have the capability to provide 2x384 kbps at RLC SAP level, per 5 MHz bandwidth per spot over 95% of the outdoor service area.	PA	The UE is only required to decode one FACH carried over one S-CCPCH. However multiple CTCH could be embed into the same FACH.
[MAE-D6-1-C-REQ-137]	§5.5	In urban environment (both terrestrial repeaters and T-UMTS networks are deployed), the SDMB system shall have the capability to provide 2x384 kbps at RLC SAP level, per 5 MHz bandwidth per spot over 95% [TBC] of the indoor (1st wall) service area.	PA	Indoor tests will be carried out.
[MAE-D6-1-C-REQ-138]	§5.5	In rural environment (neither Terrestrial repeaters, nor T-UMTS networks are deployed), the SDMB system shall have the capability to provide 2x384 kbps at RLC SAP level, per 5 MHz bandwidth per spot over 95% [TBC] of the outdoor service area.	NA	
[MAE-D6-1-C-REQ-061]	§5.5	In rural environment (neither Terrestrial repeaters, nor T-UMTS networks are deployed), the SDMB system shall have the capability to provide 2x384 kbps at RLC SAP level, per 5 MHz bandwidth per spot over 70% [TBC] of the indoor (1st wall) service area.	NA	
[MAE-D6-1-C-REQ-116]	§5.5	The UE shall have the capability to decode and store at least 384 kbps at RLC SAP level.	A	
[MAE-D6-1-C-REQ-158]	§5.5	The nominal performances of the SDMB system [as defined in this document] are to be reached for an arbitrary selected orbital position at 10°E.	NA	

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[MAE-D6-1-C-REQ-072]	§5.5	The SDMB system shall be designed to provide a service area over a part of the European continent, namely between (1) Latitude: 35°N and 65°N; (2) Longitude: 10°W and 30°E.	NA	
	§5.6	5.6 SECURITY REQUIREMENTS		
	§5.6.1	5.6.1 Content provider related security		
[MAE-D6-1-C-REQ-129]	§5.6.1	The SDMB system shall be able to authenticate third party content providers that provide content for SDMB transmissions.	NA	
[MAE-D6-1-C-REQ-130]	§5.6.1	The SDMB system shall be able to verify the integrity of data received from content providers.	NA	
[MAE-D6-1-C-REQ-164]	§5.6.1	The SDMB system shall allow the content providers to mark contents with DRM (e.g. content forwarding, number of accesses) according to their policy.	NA	
	§5.6.2	5.6.2 User related security		
[MAE-D6-1-C-REQ-132]	§5.6.2	The operational system may be required to authenticate the end user before allowing access to SDMB services	PA	
[MAE-D6-1-C-REQ-133]	§5.6.2	The operational system may be required to authorise access to SDMB services based upon the geographical location of the UE.	NA	
[MAE-D6-1-C-REQ-075]	§5.6.2	The operational system shall implement access control to distribute multimedia content.	NA	
[MAE-D6-1-C-REQ-073]	§5.6.2	The end user shall be able to forward contents to another end user, e.g. via the terrestrial mobile network if he/she is granted rights by DRM.	NA	
[MAE-D6-1-C-REQ-117]	§5.6.2	The UE shall forbid transmission of personal data without user agreement.	NA	
	§5.7	5.7 REGULATIONS REQUIREMENTS		
[MAE-D6-1-C-REQ-076]	§5.7	The SDMB system shall be capable of providing an equitable access to its capacity to any mobile operator requesting to use the SDMB broadcast capacity.	NA	
[MAE-D6-1-C-REQ-077]	§5.7	In order to avoid detrimental interference to terrestrial mobile systems, the Terrestrial Repeaters shall comply with the same power limits and spectrum emission masks than Terrestrial FDD base stations, as described in 3GPP 25.104.	A	
[MAE-D6-1-C-REQ-078]	§5.7	In order to avoid detrimental interference to terrestrial mobile systems, the aggregate power of the SDMB satellite(s) emissions shall not create an interference level at the UE, respectively BS, receiver in excess of 3% (TBC) of the UE, respectively BS, thermal noise level in any of the terrestrial UTRA FDD/TDD carriers.	PA	There is no satellite in the test-bed; nevertheless, the test-bed shall respect the regulations requirements.
[MAE-D6-1-C-REQ-079]	§5.7	In order to avoid detrimental interference to MSS systems operating in adjacent bands, the aggregate power of the SDMB satellite segment shall not exceed a power flux density of -143.7 dBW/m ² /25 kHz (TBC) in the band 2187.5-2200 MHz (TBC), at any location.	PA	There is no satellite in the test-bed; nevertheless, the test-bed shall respect the regulations requirements.

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[MAE-D6-1-C-REQ-080]	§5.7	In order to avoid detrimental interference to Terrestrial networks operating in the band 2170-2200 MHz, the aggregate power of the SDMB satellite segment shall not exceed a power flux density of: -128 dBW/m ² /MHz for elevation ≤ 5° -128 + 0.5*(el - 5) for 5° < elevation ≤ 25° -118 dBW/m ² /MHz for elevation > 25° over the territory of the following countries: Jordan, Turkey, Syria, Egypt, Canada, Cuba (this list is TBC). Potential coordination agreement with these countries may result in less stringent pfd limits.	NA	
	§5.8	5.8 Reliability, Availability, Maintainability & Safety REQUIREMENTS		
	§5.8.2	5.8.2 Availability and Continuity		
[MAE-D6-1-C-REQ-081]	§5.8.2	The system shall be able to provide a nominal service during 99,5% [TBC] of time over one calendar month.	NA	
[MAE-D6-1-C-REQ-125]	§5.8.2	The maximum outage duration shall be less than 2 hours [TBC].	NA	
	§5.10	5.10 DESIGN AND DEVELOPMENT REQUIREMENTS		
	§5.10.1	5.10.1 Architecture		
	§5.10.1.1	5.10.1.1 Terminal		
[MAE-D6-1-C-REQ-082]	§5.10.1.1	The UE shall be either a SDMB enabled 3G handset, a nomadic terminal embedded in a laptop or a nomadic terminal installed on board a vehicle.	A	The UE will include a handset and a laptop
[MAE-D6-1-C-REQ-083]	§5.10.1.1	The implementation of SDMB features in 3GPP standardised handset shall not modify the UE form factor (mass, aesthetic and/or volume, [TBC for volume]).	A	The fom factor of the handset itself will not be modified.
[MAE-D6-1-C-REQ-085]	§5.10.1.1	The UE shall be 3GPP MBMS compliant operating in the IMT2000 core band with extended frequency agility in the IMT2000 band allocated to Mobile Satellite System, namely 2170-2200 MHz.	PA	The UE shall be 3GPP R99 compliant operating in the IMT2000 core band without extended frequency agility in the IMT2000 band.
[MAE-D6-1-C-REQ-086]	§5.10.1.1	The UE shall have a radio sensitivity level similar or better than - 117 dBm as defined in 3GPP TS 25.101.	A	
[MAE-D6-1-C-REQ-032]	§5.10.1.1	The UE shall allow the portability of SDMB services between different UE owned by the end user, including but not limited to the ability to transfer the stored content, keys associated with subscribed services as well as user preference profile from one UE to another.	NA	
[MAE-D6-1-C-REQ-069]	§5.10.1.1	The UE should implement a local storage capacity for SDMB contents of at least 256 Mbytes.	A	
	§5.10.1.2	5.10.1.2 Terrestrial repeaters		

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[MAE-D6-1-C-REQ-089]	§5.10.1.2	The terrestrial repeaters shall be designed for possible co-siting with existing terrestrial mobile network base stations to prevent the need to set up additional radio sites.	NA	
[MAE-D6-1-C-REQ-104]	§5.10.1.2	The terrestrial repeaters shall be designed for possible independent installation.	A	
[MAE-D6-1-C-REQ-168]	§5.10.1.2	The terrestrial repeaters shall be designed for possible 3GPP radio interface evolution, keeping the same 5MHz channelisation mode.	NA	
[MAE-D6-1-C-REQ-169]	§5.10.1.2	It shall be possible to configure the terrestrial repeaters output frequency in the whole IMT 2000 MSS band plus (terrestrial) UMTS band.	NA	
[MAE-D6-1-C-REQ-170]	§5.10.1.2	The terrestrial repeaters shall be able to distribute up to three 5 MHz multiplexes in the same cell.	NA	
	§5.10.1.3	5.10.1.3 Satellite		
[MAE-D6-1-C-REQ-142]	§5.10.1.3	The satellite configuration shall be flexible in terms of number of active beams and power sharing between active beams.	NA	
[MAE-D6-1-C-REQ-143]	§5.10.1.3	The satellite shall be designed for possible 3GPP radio interface evolution, keeping the same 5MHz channelisation mode.	NA	
[MAE-D6-1-C-REQ-167]	§5.10.1.3	It shall be possible to configure the space segment to distribute up to three 5 MHz multiplexes in the same spot.	NA	
	§5.10.2	5.10.2 Interfaces		
[MAE-D6-1-C-REQ-092]	§5.10.2	From a functional point of view, the SDMB System shall be agnostic with respect to stream type / stream encoding and file type / file encoding.	NA	
	§5.10.1.3	5.10.13 Production		
[MAE-D6-1-C-REQ-093]	§5.10.1.3	The SDMB system shall be able to support multi-vendor terrestrial repeaters.	NA	A single terrestrial repeater type will be used.
[MAE-D6-1-C-REQ-094]	§5.10.1.3	The SDMB system shall be able to support multi-vendor UE.	NA	A single UE type will be used.

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