



IST Integrated Project No 507023 – MAESTRO

**D6-1.2b**

# **SDMB System Technical Requirement Document (for R2 test bed)**

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## **Abstract:**

**This document includes the MAESTRO test bed release 2 specifications. Compared to release 1, the release 2 adds network and transport layers implementations.**

**Keyword list: [SDMB system requirements test-bed R2](#)**

## EXECUTIVE SUMMARY

This document contains part of the deliverable D6-1.2 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 close integration & interworking with 3G and Beyond 3G mobile terrestrial networks.

The MAESTRO project 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 intermediate repeater.
- Estimating the development cost of the hub.
- Analysing the impacts of SDMB system on the 3G mobile network.

Task 1 of the Work Package 6 deals with the SDMB system requirements. One of the outcomes of this task is the deliverable D6-1-2 – «SDMB System Technical Requirement document (for R2)». It has been decided to deliver this document in two parts, namely D6-1-2a dealing with commercial system requirements and D6-1-2b dealing with release 2 test bed requirements.

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

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## DOCUMENT HISTORY

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2.0	17-Sept-2004	Initial draft
2.1	15-Oct-2004	Include comments from MSPS and Logica CMG
2.2	19-Nov-2004	Add applicability matrix and compliance matrix Also minor changes
2.3	9-Dec-2004	Update according to WP6 comments
2.4	21-Dec-2004	Update according to commercial system specification updates
3.0	21-Dec-2004	Final version for delivery

## DOCUMENT AUTHORS

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## **1 INTRODUCTION**

### **1.1 Background**

Task 1 of the Work Package 6 deals with the SDMB system requirements. One of the outcomes of this task is the deliverable D6-1-2 – «SDMB System Technical Requirement document (for R2)». It has been decided to deliver this document in two parts, namely D6-1-2a dealing with commercial system requirements and D6-1-2b dealing with release 2 test bed requirements.

### **1.2 Field of Application**

This document is meant to be used by the teams in charge of specifying, designing, developing, integrating, verifying and validating the release 2 MAESTRO test bed.

### **1.3 Document structure**

The document is composed of the following sections:

- Introduction
- Terms, Definitions, Abbreviated terms and symbols
- General presentation. This section introduces the test bed architecture.
- General test bed requirements. This section lists the high-level requirements of the test bed focusing on clarifying the objectives sought.
- Trials overall requirements. This section aims at providing guidelines to define to trials scenarios
- Test bed components requirements. This section lists the requirements of each component of the test bed.
- Tracability matrix. This section includes a list of all the requirements related to the commercial system and identifies the ones applicable to the release 2 test bed.
- Compliance matrix. This section includes a list of all the requirements related to the release 2 test bed. It aims to be inserted in deliverables D7-1 and D8-1 for lower tracability.



## 2 TERMS, DEFINITIONS, ABBREVIATED TERMS AND SYMBOLS

### 2.1 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.

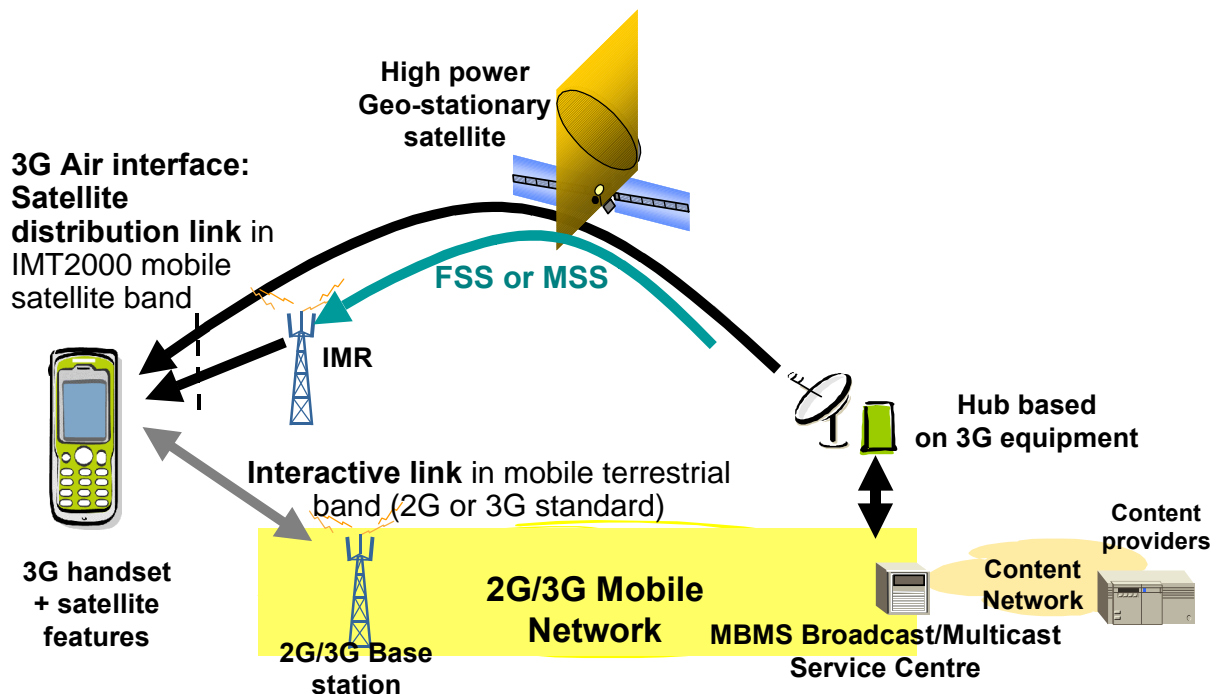


GSM	Global System for Mobile Communications	MSS	Mobile Satellite Services
GUI	Graphic User Interface	NLOS	Non Line Of Sight
GW	Gateway	Node B	UMTS Base Station
HDFSS	High Density FSS	O&M	Operation and Maintenance
HLR	Home Location Register	OBO	Output Back-Off
HPA	High Power Amplifier	OMA	Open Mobile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

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

### 3 GENERAL PRESENTATION

The Satellite Digital Multimedia Broadcasting (SDMB) system intends to implement a multi-cast layer over unicast terrestrial 3G UMTS mobile networks. As shown on Figure 1, the system concept is based on a combined satellite and terrestrial repeaters architecture for delivery of interactive broadcasting/multicasting digital multimedia services to mobile end-users. The system will aim to permit indoor penetration by means of dedicated large power GEO satellites providing several beams over Europe.



**Figure 1 : Figure 1 : SDMB system architecture**

MAESTRO aims at specifying and validating the most critical services, features, and functions of satellite system architecture, 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.

In the scope of release 2, the MAESTRO study includes setting up both a laboratory and a field test beds representative of the SDMB system. The release 2 test beds will be built on the release 1 ones. The main upgrades will consist in integrating both the BM-SC and a 2G terrestrial network to the existing platforms.

The goal of the laboratory test bed is to provide a platform to consolidate simulation results. Therefore, one of the key features of that platform is to allow reproducibility.

As in MoDiS, the goal of the field test bed is to demonstrate the feasibility of the SDMB system but using a terminal built on a commercial UE which features a higher integration level and a complete UMTS/GPRS protocol stack.

The release 2 test bed architecture is shown on the following figure. It differs from the real SDMB system in the following:

The satellite and the transmission part of the Hub have been replaced by an equivalent transmitter located on a high altitude place, set in such a way that the received radio level at the terminal is about equivalent to what would be received from a satellite. For the trial, transmission will be performed in the terrestrial IMT2000 frequency band.

The Hub network function emulator feeds the terrestrial repeaters directly.

The Hub network functions are fulfilled by a RNC simulator featuring broadcast support and adapted to the MAESTRO application.

The MAESTRO terminal is composed of a modified 3GPP mobile terminal connected to a PC. The mobile implements physical and access layers functionality while the PC implements network, transport and application functions.

The Mobile Network is a GPRS network.

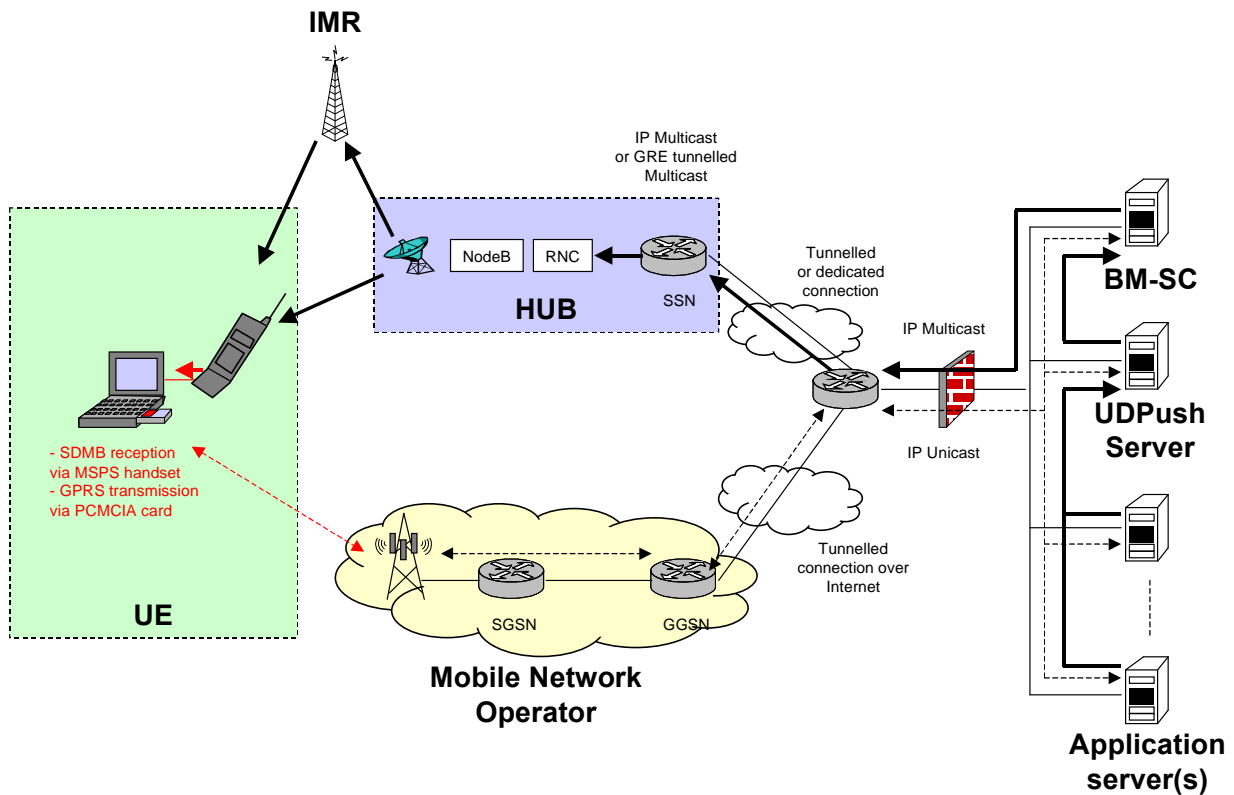


Figure 2 : Figure 2 : Test bed architecture

## 4 GENERAL TEST BED REQUIREMENTS

# Reference **MAE-D6-1-T-REQ-109**

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The MAESTRO test bed shall be designed to provide broadcast layer without permanent return link.

*Verifies: [MAE-D6-1-C-REQ-004 ]*

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# \*

# Reference **MAE-D6-1-T-REQ-002**

---

The MAESTRO test bed shall provide point to multi-point services including download and streaming.

*Verifies: [MAE-D6-1-C-REQ-019 ]*

*Verifies: [MAE-D6-1-C-REQ-110 ]*

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# \*

# Reference **MAE-D6-1-T-REQ-093**

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The MAESTRO test bed shall provide means to broadcast information to all end-user located on the test bed area.

*Comment: The MAESTRO test bed does not intend to emulate multiple spots.*

*Verifies: [MAE-D6-1-C-REQ-040 ]*

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# \*

# Reference **MAE-D6-1-T-REQ-079**

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The MAESTRO test bed shall be composed of two platforms, namely:

- a laboratory platform (referred to as laboratory test bed), and
  - a field platform (referred to as the field test bed).
- 

# \*

# Reference **MAE-D6-1-T-REQ-001**

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The MAESTRO laboratory test bed shall include:

- a Hub
- a propagation channel emulator
- an on-channel repeater
- a service centre composed of:
  - a BM-SC and a UDPush server
  - local streaming and web servers
- a mobile network
- a user terminal

*[Comment](#): The on-channel repeater and the user terminal do not intend to be integrated on the same platform. The on-channel repeater will be emulated by the SIMSTAR equipment in the configuration involving the UE.*

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# \*

# Reference **MAE-D6-1-T-REQ-059**

---

The MAESTRO field test bed shall include:

- a Hub
  - a satellite emulator (helix antenna)
  - two on-channel repeaters
  - a service centre composed of:
    - a BM-SC and a UDPush server
    - local streamer and web servers
  - a mobile network
  - one or several user terminals.
- 

# \*

# Reference **MAE-D6-1-T-REQ-062**

---

The MAESTRO test bed shall implement a representative platform of an SDMB system. It shall allow to demonstrate:

- a broadcast link
- an efficient recombination of the signals issued by the satellite emulator and the ones of the terrestrial repeaters (rake receiver).
- a complementarity with the existing GPRS system
  - through SDMB/GPRS dual mode operation, and
  - a return link - i.e. point-to-point connection using the GPRS network between the UE and the BM-SC
- a multicast addressing scheme
- a basic network functionality
- a reliable transport functionality

*[Comment](#): Described in requirement MAE-D6-1-T-REQ-082*

*[Comment](#): Described in requirement MAE-D6-1-T-REQ-083*

---

# \*



# Reference **MAE-D6-1-T-REQ-095**

---

The transport layer FEC and interleaving shall be able to compensate for short SDMB reception interruptions due to any terrestrial activity in IDLE mode, including but not limited to SDMB signal reception interruptions due to paging and measurements of current and adjacent cells.

*Verifies:* [\[MAE-D6-1-C-REQ-057\]](#)

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# \*

# Reference **MAE-D6-1-T-REQ-097**

---

The transport layer carouseling shall be able to compensate for long SDMB reception interruptions.

*Verifies:* [\[MAE-D6-1-C-REQ-059\]](#)

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# \*

# Reference **MAE-D6-1-T-REQ-092**

---

The reliable transport function shall not require real time return link (neither through SDMB nor terrestrial network) in order to improve the transmission reliability.

*Verifies:* [\[MAE-D6-1-C-REQ-033\]](#)

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# \*

## 5 TRIALS OVERALL REQUIREMENTS

# Reference **MAE-D6-1-T-REQ-080**

The MAESTRO laboratory test bed shall allow to evaluate key SDMB features and performances under different operational configurations:

*Comment: Some of the features and performances may be evaluated on a "reduced" test bed which does not implement the interactive link with the GPRS network.*

- Coverage assessment under various propagation conditions.
- Impact of different RF parameters on the transmission performances (Rate, TTI, number of blocks per TTI, ...).
- Rake receiver (qualitative) assessment.
- Evaluation of the dual mode operation performances.
- Evaluation of the reliable transport algorithms.

# \*

# Reference **MAE-D6-1-T-REQ-081**

The MAESTRO field test bed shall allow:

- To demonstrate the SDMB system concept in both outdoor and indoor environments.
- To correlate overall measured QoS with both the simulation results and the laboratory measurements.

# \*

# Reference **MAE-D6-1-T-REQ-003**

The MAESTRO laboratory test bed shall allow to perform measurements under different conditions taking into account the following criteria:

*Verifies: [MAE-D6-1-C-REQ-066 ]*

- Signal source: satellite only or satellite plus IMR(s)
- Indoor / Outdoor
- Urban / Suburban / rural environment
- Satellite elevation angle
- UE mobility speed

*Comment: ASCOM didn't commit to provide the mobility feature on the SIMSTAR in time for release 1. It will however be available for release 2.*

# \*

# Reference **MAE-D6-1-T-REQ-004**

The MAESTRO test bed shall allow characterising the transmission performances of an SDMB system using the UMTS WCDMA interface including:

- Timeslot synchronisation
- De-spreading and demodulation functions
- TFCI decoding
- Recombination of signals issued by the satellite and the IMR
- Interference control

*Comment: Both co-channel and de-orthogonalisation interferences will be studied*

# \*

# Reference **MAE-D6-1-T-REQ-005**

The MAESTRO test bed shall allow testing some access layer functions including:

- UE camping on cell
- UE idle mode (system information reception over BCCH)
- Down-link FACH (reception with several data rates)

# \*

# Reference **MAE-D6-1-T-REQ-082**

The MAESTRO test bed shall allow testing some network layer functions including:

- Data Cipherring/Decipherring
- User authentication mechanism
- User authorisation mechanism

# \*

# Reference **MAE-D6-1-T-REQ-083**

The MAESTRO test bed shall allow testing some transport layer functions including:

- Packet level FEC
- Packet interleaving
- Carousel
- Selective retransmission [To be confirmed]

# \*

# Reference **MAE-D6-1-T-REQ-060**

The MAESTRO laboratory test bed shall allow to measure modulation accuracy of the SDMB signal. This could be done at the output of the on-channel repeater. Performances to be measured are:

*Comment: The modulation accuracy will be measured using a spectrum analyser provided by Agilent.*

- Pilot power
  - Synchronisation power
  - Ec/Io
  - EVM and PCDE
  - Spurious level
- 

# \*

## 6 TEST BED COMPONENTS REQUIREMENTS

### 6.1 UE requirements

# Reference **MAE-D6-1-T-REQ-063**

The MAESTRO UE doesn't have to be an integrated handset terminal. It can be composed of:

- one mobile terminal for SDMB data reception while monitoring GPRS
- one mobile terminal for GPRS data transfer
- one PC for the implementation of higher layers (network, transport and application), tracing and data post-processing

# \*

# Reference **MAE-D6-1-T-REQ-064**

The SDMB mobile terminal shall be based out of a 3GPP compliant mobile terminal (release 99).

# \*

# Reference **MAE-D6-1-T-REQ-012**

The SDMB receiver shall be able to retrieve data transmitted over a 3GPP standardised UTRA FDD W-CDMA carrier.

*Comment: Data will be embedded in a FACH channel.*

*Verifies: [MAE-D6-1-C-REQ-050]*

# \*

# Reference **MAE-D6-1-T-REQ-010**

The SDMB receiver shall operate in the following frequency range (GHz):  $2.11 \leq f \leq 2.17$

# \*

# Reference **MAE-D6-1-T-REQ-014**

The MAESTRO UE shall have the capability to decode and store 1 S-CCPCH at 384kbps.

*Comment: For both Release 1 and 2, the UE is only required to decode a single FACH. In release 2, multiple services could be multiplex onto that FACH.*

*Verifies: [MAE-D6-1-C-REQ-116]*

# \*

# Reference **MAE-D6-1-T-REQ-016**

The MT shall be able to capture the incoming data and transfer them transparently to the PC for further processing.

# \*

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# Reference **MAE-D6-1-T-REQ-090**

---

The UE shall implement a function which distinguishes downloaded content from streamed content.

*Comment: This function shall be implemented in the PC.*

---

# \*

---

# Reference **MAE-D6-1-T-REQ-086**

---

The MAESTRO UE shall allow storage of SDMB data based on the type of service delivered.

*Verifies: [MAE-D6-1-C-REQ-020 ]*

*Verifies: [MAE-D6-1-C-REQ-118 ]*

- Downloaded content shall be automatically stored on the PC
  - Streamed content may be stored on the PC upon end-user request.
- 

# \*

---

# Reference **MAE-D6-1-T-REQ-087**

---

The end user shall be able to access any content stored in the UE without any limitation.

*Verifies: [MAE-D6-1-C-REQ-109 ]*

---

# \*

---

# Reference **MAE-D6-1-T-REQ-068**

---

The MAESTRO UE shall be able to demonstrate streaming capabilities.

*Comment: Rate and TTI to be used are left to be specified by MSPS accordingly to the mobile terminal capabilities (The minimum data rate targeted is 100kbps). Assuming the streamed data cannot be displayed on the mobile terminal, the screen size of a handset should be reproduced on the PC.*

---

# \*

---

# Reference **MAE-D6-1-T-REQ-065**

---

The MAESTRO UE shall be able to receive SDMB data while processing idle operations on the GPRS network.

*Comment: It shall be possible to interrupt the SDMB reception to take a phone call.*

*Verifies: [MAE-D6-1-C-REQ-003 ]*

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# \*

---

# Reference **MAE-D6-1-T-REQ-066**

---

The MAESTRO UE shall be able to exchange information with the BM-SC through the GPRS network.

*Comment: The point-to-point connection on the terrestrial network can be establish with the GPRS terminal.*

*Verifies: [MAE-D6-1-C-REQ-015 ]*

---

# \*

# Reference **MAE-D6-1-T-REQ-069**

The MAESTRO UE shall implement reliable transport functions to compensate for the interruptions in the SDMB reception due to the dual mode processing.

*Verifies: [MAE-D6-1-C-REQ-033]*

# \*

# Reference **MAE-D6-1-T-REQ-091**

In case the end-user selects an incomplete content, the UE shall fetch the selected content missing blocks using p-t-p session established via the terrestrial mobile network associated to the UE.

*Comment: The selective retransmission would be a nice to have but it is not a requirement.*

*Verifies: [MAE-D6-1-C-REQ-036]*

# \*

# Reference **MAE-D6-1-T-REQ-071**

The MAESTRO UE shall be able to support broadcast/multicast addressing scheme.

# \*

# Reference **MAE-D6-1-T-REQ-067**

The MAESTRO UE shall implement network layer functions to ensure:

- Data confidentiality (data ciphering and key distribution)
- Access of the BM-SC by only authorised UE

# \*

# Reference **MAE-D6-1-T-REQ-094**

The UE shall be able to combine coherently several identical signals due to multi-path effects and/or terrestrial repetition.

*Comment: This is assuming all signals are within the UE's rake window.*

*Verifies: [MAE-D6-1-C-REQ-052]*

# \*

# Reference **MAE-D6-1-T-REQ-104**

The MAESTRO UE rake receiver shall comply with the rake window size and the number of recombining fingers agreed on with the consortium.

*Comment: Rake window size and number of fingers will be kept confidential within the MAESTRO consortium.*

# \*

# Reference **MAE-D6-1-T-REQ-013**

The MAESTRO UE shall be equipped with a SIM card to connect to the GPRS network.

# \*

# Reference **MAE-D6-1-T-REQ-018**

The MAESTRO UE shall be able to monitor and store BLER and received mean power.

*Comment: In order to automate the trials, it is crucial to be able to store the BLER on the PC.*

# \*

# Reference **MAE-D6-1-T-REQ-054**

The MAESTRO UE shall be able to monitor and store the IP packet error rate.

*Comment: In order to automate the trials, it is crucial to be able to store the PER on the PC.*

# \*

# Reference **MAE-D6-1-T-REQ-043**

The MAESTRO UE shall be able to keep track of the incoming data rate at the IP level.

*Verifies: [MAE-D6-1-C-REQ-006]*

# \*

# Reference **MAE-D6-1-T-REQ-111**

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

*Verifies: [MAE-D6-1-C-REQ-086]*

# \*

## 6.2 Propagation Channel Emulator requirements

# Reference **MAE-D6-1-T-REQ-019**

The propagation channel emulator must interface with a Node B, a terminal or an on-channel repeater.

# \*

# Reference **MAE-D6-1-T-REQ-020**

The propagation channel emulator must interface with the other components of the system in the following frequency range (GHz):  $2.11 \leq f \leq 2.17$ .

# \*

# Reference **MAE-D6-1-T-REQ-041**

The propagation channel emulator shall emulate the following links:

*Verifies: [MAE-D6-1-C-REQ-071]*

- Satellite to UE
- Satellite to IMR
- IMR to UE

# \*

# Reference **MAE-D6-1-T-REQ-021**

The propagation channel emulator must be able to support multi-path fading.

# \*



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# Reference **MAE-D6-1-T-REQ-042**

---

The propagation emulator channel shall provide non linearity impairments.

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# \*

### 6.3 IMR requirements

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# Reference **MAE-D6-1-T-REQ-023**

---

The on-channel repeater shall transmit the same signal as the one received.

*[Comment: The distortion introduced by the on-channel repeater on the signal shall be within the 3GPP specifications 25.106.](#)*

*[Verifies: \[MAE-D6-1-C-REQ-051\]](#)*

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# \*

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# Reference **MAE-D6-1-T-REQ-024**

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The on-channel repeater shall operate in the UMTS frequency range:  $2.11\text{GHz} \leq F \leq 2.17\text{GHz}$ .

---

# \*

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# Reference **MAE-D6-1-T-REQ-025**

---

The I/O power level of the on-channel repeater shall be:

- Minimum input power:
  - Maximum output power: -25dBm for laboratory testbed
- 

# \*

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# Reference **MAE-D6-1-T-REQ-026**

---

Propagation delay through the on-channel repeater shall be  $6.4\mu\text{s}$ .

*[Comment: This is in order to be able to prove that the UE can reliably recombine signals coming from the satellite emulator and signals coming from the repeater.](#)*

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# \*

### 6.4 HUB requirements

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# Reference **MAE-D6-1-T-REQ-028**

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The Hub shall be composed of a node B and an RNC simulator.

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# \*

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# Reference **MAE-D6-1-T-REQ-038**

---

The Hub shall be able to generate multiple S-CCPCH channels to allow interference performances measurements at the terminal.

*[Comment: A test equipment will be used to measure the interference level.](#)*

*[Verifies: \[MAE-D6-1-C-REQ-066\]](#)*

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# \*

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# Reference **MAE-D6-1-T-REQ-030**

---

The Node B shall output data over a 3GPP standardised UTRA FDD W-CDMA carrier.

Verifies: [MAE-D6-1-C-REQ-050]

---

# \*

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# Reference **MAE-D6-1-T-REQ-078**

---

The Node B shall operate in the UMTS frequency range:  $2.11\text{GHz} \leq F \leq 2.17\text{GHz}$ .

# \*

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# Reference **MAE-D6-1-T-REQ-032**

---

The Node B shall comply to the 3GPP specifications described in TS 25.104

# \*

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# Reference **MAE-D6-1-T-REQ-029**

---

The Node B shall interface on one side with the propagation channel emulator and on the other side with the RNC simulator.

# \*

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# Reference **MAE-D6-1-T-REQ-072**

---

The RNC simulator shall interface on one side with the Node B and on the other side with the BM-SC from which it receives data to broadcast.

# \*

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# Reference **MAE-D6-1-T-REQ-035**

---

The RNC simulator shall feature broadcast support adapted to the MAESTRO platform constraints.

# \*

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# Reference **MAE-D6-1-T-REQ-047**

---

The RNC simulator shall configure a FACH user rate of 384 kbps.

# \*

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# Reference **MAE-D6-1-T-REQ-036**

---

The RNC simulator shall include an internal data generator used to generate extra S-CCPCH.

# \*

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# Reference **MAE-D6-1-T-REQ-049**

---

The RNC shall be able to receive packet over an ethernet interface.

# \*

---

# Reference **MAE-D6-1-T-REQ-051**

---

The RNC simulator shall feature a simplified user interface to modify parameters such as:

- SIB content
  - Node B configuration parameters
  - Internal parameters (eg: name of the source file to transmit, ...)
- 

# \*

# Reference **MAE-D6-1-T-REQ-108**

The RNC shall maintain one IP address per CTCH. The IP address value will be received from the BM-SC.

# \*

# Reference **MAE-D6-1-T-REQ-037**

The RNC simulator shall send the SDMB-specific data required for FACH configuration of the UE within the system information 3.

# \*

# Reference **MAE-D6-1-T-REQ-031**

The output power level of the Node B shall not exceed -25dBm.

# \*

## 6.5 Service centre requirements

# Reference **MAE-D6-1-T-REQ-107**

The service centre shall include:

- a BM-SC emulator
- a Push server
- local streaming and web servers

# \*

# Reference **MAE-D6-1-T-REQ-099**

The BM-SC shall be able to interface with the Hub via a dedicated or tunnelled connection.

# \*

# Reference **MAE-D6-1-T-REQ-073**

The BM-SC shall be able to interface with the UE through the GPRS network.

# \*

# Reference **MAE-D6-1-T-REQ-074**

The service centre shall implement the server side of :

- Network layer functions
- Transport layer functions
- Application layer functions

# \*

# Reference **MAE-D6-1-T-REQ-075**

The network layer functions of the BM-SC shall ensure:

*Verifies: [MAE-D6-1-C-REQ-123]*

- Data confidentiality (data ciphering and key distribution)
- Access of the BM-SC by only authorised UE

# \*

# Reference **MAE-D6-1-T-REQ-076**

---

The transport layer functions of the Push server shall include:

[Verifies: \[MAE-D6-1-C-REQ-036 \]](#)

[Verifies: \[MAE-D6-1-C-REQ-098 \]](#)

[Verifies: \[MAE-D6-1-C-REQ-034 \]](#)

- Packet level FEC
- Packet level interleaving
- Carousel
- Selective retransmission using either the SDMB or the GPRS networks

*[Comment: The selective retransmission would be a nice to have but it is not a requirement.](#)*

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# \*

# Reference **MAE-D6-1-T-REQ-077**

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The BM-SC shall implement a multicast addressing scheme.

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# \*

# Reference **MAE-D6-1-T-REQ-085**

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The BM-SC shall be able to transmit data using both the GPRS network and the SDMB network though the selection between the two networks does not need to be based upon audience or QoS criteria.

*[Comment: This feature is related to terrestrial retransmission.](#)*

[Verifies: \[MAE-D6-1-C-REQ-010 \]](#)

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# \*

# Reference **MAE-D6-1-T-REQ-089**

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The BM-SC shall append a tag to every content to indicate whether it has to be distributed using download or streaming applications.

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# \*

## 7 TRACABILITY FROM THE APPLICABLE COMMERCIAL SYSTEM REQUIREMENTS TO THE TEST BED REQUIREMENTS

The aim of this section is to summarize all the Commercial Product requirements tagged as "fully Applicable" or "Partially Applicable" in the D6-1.2a document and to associate them the Test Bed Requirement verifying them.

<i>PUID</i>	<i>§ N°</i>	<i>Requirements Specification</i>	<i>MAE TBR2 App.</i>	<i>MAE TBR2 Justification</i>	<i>verified by...</i>
	<b>§5</b>	<b>5 COMMERCIAL PRODUCT REQUIREMENTS</b>			
	<b>§5.1</b>	<b>5.1 EXTERNAL INTERFACE REQUIREMENTS</b>			
<b>[MAE-D6-1-C-REQ-002 ]</b>	§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.	
	<b>§5.2</b>	<b>5.2 OPERATIONAL REQUIREMENTS</b>			
	<b>§5.2.2</b>	<b>5.2.2 Operability</b>			
	<b>§5.2.2.1</b>	<b>5.2.2.1 General requirements for operability</b>			
<b>[MAE-D6-1-C-REQ-161 ]</b>	§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.	
	<b>§5.2.2.3</b>	<b>5.2.2.3 Observability and Monitoring</b>			
<b>[MAE-D6-1-C-REQ-005 ]</b>	§5.2.2.3	The UE shall be able to indicate the SDMB services available on user demand.	PA	OK with a single service.	
<b>[MAE-D6-1-C-REQ-006 ]</b>	§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-D6-1.2b <b>[MAE-D6-1-T-REQ-043 ]</b> The MAESTRO UE shall be able to keep track of the incoming data rate at the IP level.
	<b>§5.2.3</b>	<b>5.2.3 Operation scenarios</b>			
	<b>§5.2.3.1</b>	<b>5.2.3.1 Transmission media selection</b>			

<i>PUID</i>	<i>§ N°</i>	<i>Requirements Specification</i>	<i>MAE TBR2 App.</i>	<i>MAE TBR2 Justification</i>	<i>verified by...</i>
[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-D6-1.2b [MAE-D6-1-T-REQ-085 ] The BM-SC shall be able to transmit data using both the GPRS network and the SDMB network though the selection between the two networks does not need to be based upon audience or QoS criteria.
	<b>§5.2.3.3</b>	<b>5.2.3.3 Cohabitation with 2G-3G operations</b>			
[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-D6-1.2b [MAE-D6-1-T-REQ-065 ] The MAESTRO UE shall be able to receive SDMB data while processing idle operations on the GPRS 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		MAE-D6-1.2b [MAE-D6-1-T-REQ-066 ] The MAESTRO UE shall be able to exchange information with the BM-SC through the GPRS network.
	<b>§5.3</b>	<b>5.3 FUNCTIONAL REQUIREMENTS</b>			
	<b>§5.3.2</b>	<b>5.3.2 Delivery methods</b>			
	<b>§5.3.2.1</b>	<b>5.3.2.1 Delivery methods types</b>			
[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		MAE-D6-1.2b [MAE-D6-1-T-REQ-002 ] The MAESTRO test bed shall provide point to multi-point services including download and streaming.
	<b>§5.3.2.2</b>	<b>5.3.2.2 Download</b>			
[MAE-D6-1-C-REQ-155 ]	§5.3.2.2	The SDMB system shall allow distribution of files, one or several times.	A		

<i>PUID</i>	<i>§ N°</i>	<i>Requirements Specification</i>	<i>MAE TBR2 App.</i>	<i>MAE TBR2 Justification</i>	<i>verified by...</i>
[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-D6-1.2b [MAE-D6-1-T-REQ-087 ] The end user shall be able to access any content stored in the UE without any limitation.
[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-D6-1.2b [MAE-D6-1-T-REQ-086 ] The MAESTRO UE shall allow storage of SDMB data based on the type of service delivered. - Downloaded content shall be automatically stored on the PC - Streamed content may be stored on the PC upon end-user request.
	<b>§5.3.2.3</b>	<b>5.3.2.3 Streaming</b>			
[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-D6-1.2b [MAE-D6-1-T-REQ-002 ] The MAESTRO test bed shall provide point to multi-point services including download and streaming.
[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.	MAE-D6-1.2b [MAE-D6-1-T-REQ-086 ] The MAESTRO UE shall allow storage of SDMB data based on the type of service delivered. - Downloaded content shall be automatically stored on the PC - Streamed content may be stored on the PC upon end-user request.
	<b>§5.3.3</b>	<b>5.3.3 Application layer</b>			
	<b>§5.3.3.6</b>	<b>5.3.3.6 Content selection</b>			
[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		

<i>PUID</i>	<i>§ N°</i>	<i>Requirements Specification</i>	<i>MAE TBR2 App.</i>	<i>MAE TBR2 Justification</i>	<i>verified by...</i>
<b>[MAE-D6-1-C-REQ-036 ]</b>	§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	MAE-D6-1.2b <b>[MAE-D6-1-T-REQ-076 ]</b> The transport layer functions of the Push server shall include: - Packet level FEC - Packet level interleaving - Carousel - Selective retransmission using either the SDMB or the GPRS networks ----- MAE-D6-1.2b <b>[MAE-D6-1-T-REQ-091 ]</b> In case the end-user selects an incomplete content, the UE shall fetch the selected content missing blocks using p-t-p session established via the terrestrial mobile network associated to the UE.
	<b>§5.3.4</b>	<b>5.3.4 Transport layer</b>			
<b>[MAE-D6-1-C-REQ-033 ]</b>	§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-D6-1.2b <b>[MAE-D6-1-T-REQ-069 ]</b> The MAESTRO UE shall implement reliable transport functions to compensate for the interruptions in the SDMB reception due to the dual mode processing. ----- MAE-D6-1.2b <b>[MAE-D6-1-T-REQ-092 ]</b> The reliable transport function shall not require real time return link (neither through SDMB nor terrestrial network) in order to improve the transmission reliability.
<b>[MAE-D6-1-C-REQ-034 ]</b>	§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-D6-1.2b <b>[MAE-D6-1-T-REQ-076 ]</b> The transport layer functions of the Push server shall include: - Packet level FEC - Packet level interleaving - Carousel - Selective retransmission using either the SDMB or the GPRS networks



<i>PUID</i>	<i>§ N°</i>	<i>Requirements Specification</i>	<i>MAE TBR2 App.</i>	<i>MAE TBR2 Justification</i>	<i>verified by...</i>
[MAE-D6-1-C-REQ-098 ]	§5.3.4	The Reliable transport function shall implement a content protection via content repetition (carousel).	A		MAE-D6-1.2b [MAE-D6-1-T-REQ-076 ] The transport layer functions of the Push server shall include: - Packet level FEC - Packet level interleaving - Carousel - Selective retransmission using either the SDMB or the GPRS networks
[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.	
	<b>§5.3.5</b>	<b>5.3.5 Network layer</b>			
[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-D6-1.2b [MAE-D6-1-T-REQ-093 ] The MAESTRO test bed shall provide means to broadcast information to all end-user located on the test bed area.
[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	
	<b>§5.3.6</b>	<b>5.3.6 Access layer</b>			
[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-D6-1.2b [MAE-D6-1-T-REQ-109 ] The MAESTRO test bed shall be designed to provide broadcast layer without permanent return link.
[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	
	<b>§5.3.7</b>	<b>5.3.7 Physical layer</b>			

<i>PUID</i>	<i>§ N°</i>	<i>Requirements Specification</i>	<i>MAE TBR2 App.</i>	<i>MAE TBR2 Justification</i>	<i>verified by...</i>
[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-D6-1.2b [MAE-D6-1-T-REQ-041 ] The propagation channel emulator shall emulate the following links: - Satellite to UE - Satellite to IMR - IMR to UE
[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-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-D6-1.2b [MAE-D6-1-T-REQ-012 ] The SDMB receiver shall be able to retrieve data transmitted over a 3GPP standardised UTRA FDD W-CDMA carrier. ----- MAE-D6-1.2b [MAE-D6-1-T-REQ-030 ] The Node B shall output data over a 3GPP standardised UTRA FDD W-CDMA carrier.
[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-D6-1.2b [MAE-D6-1-T-REQ-023 ] The on-channel repeater shall transmit the same signal as the one received.
[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		MAE-D6-1.2b [MAE-D6-1-T-REQ-094 ] The UE shall be able to combine coherently several identical signals due to multi-path effects and/or terrestrial repetition.
	§5.3.9	<b>5.3.9 Charging and billing function</b>			
[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	
	§5.3.10	<b>5.3.10 System resources sharing</b>			

<i>PUID</i>	<i>§ N°</i>	<i>Requirements Specification</i>	<i>MAE TBR2 App.</i>	<i>MAE TBR2 Justification</i>	<i>verified by...</i>
[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-D6-1.2b [MAE-D6-1-T-REQ-075 ] The network layer functions of the BM-SC shall ensure: - Data confidentiality (data ciphering and key distribution) - Access of the BM-SC by only authorised UE
	<b>§5.4</b>	<b>5.4 PERFORMANCE REQUIREMENTS</b>			
	<b>§5.4.1</b>	<b>5.4.1 Service and application</b>			
[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.	
[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	
	<b>§5.4.2</b>	<b>5.4.2 Transport layer</b>			

<i>PUID</i>	<i>§ N°</i>	<i>Requirements Specification</i>	<i>MAE TBR2 App.</i>	<i>MAE TBR2 Justification</i>	<i>verified by...</i>
[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-D6-1.2b [MAE-D6-1-T-REQ-095 ] The transport layer FEC and interleaving shall be able to compensate for short SDMB reception interruptions due to any terrestrial activity in IDLE mode, including but not limited to SDMB signal reception interruptions due to paging and measurements of current and adjacent cells.
[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		MAE-D6-1.2b [MAE-D6-1-T-REQ-097 ] The transport layer carrouseling shall be able to compensate for long SDMB reception interruptions.
	§5.4.5	<b>5.4.5 Physical layer</b>			
	§5.4.5.1	<b>5.4.5.1 Link to User Equipment</b>			
[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.	
	§5.4.6	<b>5.4.6 Cross-layer performances</b>			
[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	

<i>PUID</i>	<i>§ N°</i>	<i>Requirements Specification</i>	<i>MAE TBR2 App.</i>	<i>MAE TBR2 Justification</i>	<i>verified by...</i>
[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.	
	<b>§5.5</b>	<b>5.5 CAPACITY REQUIREMENTS</b>			
[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 embedded into the same FACH.	MAE-D6-1.2b [MAE-D6-1-T-REQ-003 ] The MAESTRO <u>laboratory test bed</u> shall allow to perform measurements under different conditions taking into account the following criteria: - Signal source: satellite only or satellite plus IMR(s) - Indoor / Outdoor - Urban / Suburban / rural environment - Satellite elevation angle - UE mobility speed ----- MAE-D6-1.2b [MAE-D6-1-T-REQ-038 ] The Hub shall be able to generate multiple S-CCPCH channels to allow interference performances measurements at the terminal.
[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-116 ]	§5.5	The UE shall have the capability to decode and store at least 384 kbps at RLC SAP level.	A		MAE-D6-1.2b [MAE-D6-1-T-REQ-014 ] The MAESTRO UE shall have the capability to decode and store 1 S-CCPCH at 384kbps.
	<b>§5.6</b>	<b>5.6 SECURITY REQUIREMENTS</b>			
	<b>§5.6.2</b>	<b>5.6.2 User related security</b>			
[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		
	<b>§5.7</b>	<b>5.7 REGULATIONS REQUIREMENTS</b>			

<i>PUID</i>	<i>§ N°</i>	<i>Requirements Specification</i>	<i>MAE TBR2 App.</i>	<i>MAE TBR2 Justification</i>	<i>verified by...</i>
[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 <sup>2</sup> /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.	
	<b>§5.10</b>	<b>5.10 DESIGN AND DEVELOPMENT REQUIREMENTS</b>			
	<b>§5.10.1</b>	<b>5.10.1 Architecture</b>			
	<b>§5.10.1.1</b>	<b>5.10.1.1 Terminal</b>			
[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 form factor of the handset itself will not be modified.	

<i>PUID</i>	<i>§ N°</i>	<i>Requirements Specification</i>	<i>MAE TBR2 App.</i>	<i>MAE TBR2 Justification</i>	<i>verified by...</i>
<b>[MAE-D6-1-C-REQ-085 ]</b>	§5.1 0.1.1	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.	
<b>[MAE-D6-1-C-REQ-086 ]</b>	§5.1 0.1.1	The UE shall have a radio sensitivity level similar or better than - 117 dBm as defined in 3GPP TS 25.101.	A		MAE-D6-1.2b <b>[MAE-D6-1-T-REQ-111 ]</b> The MAESTRO UE shall have a radio sensitivity level similar or better than -117dBm as defined in 3GPP TS 25.101.
<b>[MAE-D6-1-C-REQ-069 ]</b>	§5.1 0.1.1	The UE should implement a local storage capacity for SDMB contents of at least 256 Mbytes.	A		
	<b>§5.1 0.1.2</b>	<b>5.10.1.2 Terrestrial repeaters</b>			
<b>[MAE-D6-1-C-REQ-104 ]</b>	§5.1 0.1.2	The terrestrial repeaters shall be designed for possible independent installation.	A		

## 8 APPENDIX - SUMMARY OF THE TEST BED REQUIREMENTS FOR TRIALS SPECIFICATIONS

The purpose of this section is to provide a summary of the Test Bed requirements as a framework for the D7-1 Test Bed integration document and the D8-1 Trials Specifications document.

<i>Ref #</i>	<i>Requirement [D6-1.2b]</i>	<i>Validation (Lab/Field)</i>	<i>Trial Scenario Ref #</i>	<i>Comments</i>
	<b>4 General test bed requirements</b>			
[MAE-D6-1-T-REQ-109 ]	The MAESTRO test bed shall be designed to provide broadcast layer without permanent return link.			
[MAE-D6-1-T-REQ-002 ]	The MAESTRO test bed shall provide point to multi-point services including download and streaming.			
[MAE-D6-1-T-REQ-093 ]	The MAESTRO test bed shall provide means to broadcast information to all end-user located on the test bed area.			
[MAE-D6-1-T-REQ-079 ]	The MAESTRO test bed shall be composed of two platforms, namely: - a laboratory platform (referred to as laboratory test bed), and - a field platform (referred to as the field test bed).			
[MAE-D6-1-T-REQ-001 ]	The MAESTRO laboratory test bed shall include: - a Hub - a propagation channel emulator - an on-channel repeater - a service centre composed of: - a mobile network - a user terminal			
[MAE-D6-1-T-REQ-059 ]	The MAESTRO field test bed shall include: - a Hub - a satellite emulator (helix antenna) - two on-channel repeaters - a service centre composed of: - a mobile network - one or several user terminals.			
[MAE-D6-1-T-REQ-062 ]	The MAESTRO test bed shall implement a representative platform of an SDMB system. It shall allow to demonstrate: - a broadcast link - an efficient recombination of the signals issued by the satellite emulator and the ones of the terrestrial repeaters (rake receiver). - a complementarity with the existing GPRS system - a multicast addressing scheme - a basic network functionality - a reliable transport functionality			
[MAE-D6-1-T-REQ-095 ]	The transport layer FEC and interleaving shall be able to compensate for short SDMB reception interruptions due to any terrestrial activity in IDLE mode, including but not limited to SDMB signal reception interruptions due to paging and measurements of current and adjacent cells.			



Ref #	Requirement [D6-1.2b]	Validation (Lab/Field)	Trial Scenario Ref #	Comments
[MAE-D6-1-T-REQ-097]	The transport layer carousel shall be able to compensate for long SDMB reception interruptions.			
[MAE-D6-1-T-REQ-092]	The reliable transport function shall not require real time return link (neither through SDMB nor terrestrial network) in order to improve the transmission reliability.			
	<b>5 Trials Overall Requirements</b>			
[MAE-D6-1-T-REQ-080]	The MAESTRO <u>laboratory test bed</u> shall allow to evaluate key SDMB features and performances under different operational configurations: <ul style="list-style-type: none"> <li>- Coverage assessment under various propagation conditions.</li> <li>- Impact of different RF parameters on the transmission performances (Rate, TTI, number of blocks per TTI, ...).</li> <li>- Rake receiver (qualitative) assessment.</li> <li>- Evaluation of the dual mode operation performances.</li> <li>- Evaluation of the reliable transport algorithms.</li> </ul>			
[MAE-D6-1-T-REQ-081]	The MAESTRO <u>field test bed</u> shall allow: <ul style="list-style-type: none"> <li>- To demonstrate the SDMB system concept in both outdoor and indoor environments.</li> <li>- To correlate overall measured QoS with both the simulation results and the laboratory measurements.</li> </ul>			
[MAE-D6-1-T-REQ-003]	The MAESTRO <u>laboratory test bed</u> shall allow to perform measurements under different conditions taking into account the following criteria: <ul style="list-style-type: none"> <li>- Signal source: satellite only or satellite plus IMR(s)</li> <li>- Indoor / Outdoor</li> <li>- Urban / Suburban / rural environment</li> <li>- Satellite elevation angle</li> <li>- UE mobility speed</li> </ul>			
[MAE-D6-1-T-REQ-004]	The MAESTRO test bed shall allow characterising the transmission performances of an SDMB system using the UMTS WCDMA interface including: <ul style="list-style-type: none"> <li>- Timeslot synchronisation</li> <li>- De-spreading and demodulation functions</li> <li>- TFCI decoding</li> <li>- Recombination of signals issued by the satellite and the IMR</li> <li>- Interference control</li> </ul>			
[MAE-D6-1-T-REQ-005]	The MAESTRO test bed shall allow testing some access layer functions including: <ul style="list-style-type: none"> <li>- UE camping on cell</li> <li>- UE idle mode (system information reception over BCCH)</li> <li>- Down-link FACH (reception with several data rates)</li> </ul>			
[MAE-D6-1-T-REQ-082]	The MAESTRO test bed shall allow testing some network layer functions including: <ul style="list-style-type: none"> <li>- Data Ciphering/Deciphering</li> <li>- User authentication mechanism</li> <li>- User authorisation mechanism</li> </ul>			

Ref #	Requirement [D6-1.2b]	Validation (Lab/Field)	Trial Scenario Ref #	Comments
[MAE-D6-1-T-REQ-083 ]	The MAESTRO test bed shall allow testing some transport layer functions including: <ul style="list-style-type: none"> <li>- Packet level FEC</li> <li>- Packet interleaving</li> <li>- Carousel</li> <li>- Selective retransmission [To be confirmed]</li> </ul>			
[MAE-D6-1-T-REQ-060 ]	The MAESTRO <u>laboratory test bed</u> shall allow to measure modulation accuracy of the SDMB signal. This could be done at the output of the on-channel repeater. Performances to be measured are: <ul style="list-style-type: none"> <li>- Pilot power</li> <li>- Synchronisation power</li> <li>- Ec/Io</li> <li>- EVM and PCDE</li> <li>- Spurious level</li> </ul>			
	<b>6 Test Bed Components Requirements</b>			
	<b>6.1 UE requirements</b>			
[MAE-D6-1-T-REQ-063 ]	The MAESTRO UE doesn't have to be an integrated handset terminal. It can be composed of: <ul style="list-style-type: none"> <li>- one mobile terminal for SDMB data reception while monitoring GPRS</li> <li>- one mobile terminal for GPRS data transfer</li> <li>- one PC for the implementation of higher layers (network, transport and application), tracing and data post-processing</li> </ul>			
[MAE-D6-1-T-REQ-064 ]	The SDMB mobile terminal shall be based out of a 3GPP compliant mobile terminal (release 99).			
[MAE-D6-1-T-REQ-012 ]	The SDMB receiver shall be able to retrieve data transmitted over a 3GPP standardised UTRA FDD W-CDMA carrier.			
[MAE-D6-1-T-REQ-010 ]	The SDMB receiver shall operate in the following frequency range (GHz): $2.11 \leq f \leq 2.17$			
[MAE-D6-1-T-REQ-014 ]	The MAESTRO UE shall have the capability to decode and store 1 S-CCPCH at 384kbps.			
[MAE-D6-1-T-REQ-016 ]	The MT shall be able to capture the incoming data and transfer them transparently to the PC for further processing.			
[MAE-D6-1-T-REQ-090 ]	The UE shall implement a function which distinguishes downloaded content from streamed content.			
[MAE-D6-1-T-REQ-086 ]	The MAESTRO UE shall allow storage of SDMB data based on the type of service delivered. <ul style="list-style-type: none"> <li>- Downloaded content shall be automatically stored on the PC</li> <li>- Streamed content may be stored on the PC upon end-user request.</li> </ul>			
[MAE-D6-1-T-REQ-087 ]	The end user shall be able to access any content stored in the UE without any limitation.			
[MAE-D6-1-T-REQ-068 ]	The MAESTRO UE shall be able to demonstrate streaming capabilities.			
[MAE-D6-1-T-REQ-065 ]	The MAESTRO UE shall be able to receive SDMB data while processing idle operations on the GPRS network.			

Ref #	Requirement [D6-1.2b]	Validation (Lab/Field)	Trial Scenario Ref #	Comments
[MAE-D6-1-T-REQ-066]	The MAESTRO UE shall be able to exchange information with the BM-SC through the GPRS network.			
[MAE-D6-1-T-REQ-069]	The MAESTRO UE shall implement reliable transport functions to compensate for the interruptions in the SDMB reception due to the dual mode processing.			
[MAE-D6-1-T-REQ-091]	In case the end-user selects an incomplete content, the UE shall fetch the selected content missing blocks using p-t-p session established via the terrestrial mobile network associated to the UE.			
[MAE-D6-1-T-REQ-071]	The MAESTRO UE shall be able to support broadcast/multicast addressing scheme.			
[MAE-D6-1-T-REQ-067]	The MAESTRO UE shall implement network layer functions to ensure: <ul style="list-style-type: none"> <li>- Data confidentiality (data ciphering and key distribution)</li> <li>- Access of the BM-SC by only authorised UE</li> </ul>			
[MAE-D6-1-T-REQ-094]	The UE shall be able to combine coherently several identical signals due to multi-path effects and/or terrestrial repetition.			
[MAE-D6-1-T-REQ-104]	The MAESTRO UE rake receiver shall comply with the rake window size and the number of recombining fingers agreed on with the consortium.			
[MAE-D6-1-T-REQ-013]	The MAESTRO UE shall be equipped with a SIM card to connect to the GPRS network.			
[MAE-D6-1-T-REQ-018]	The MAESTRO UE shall be able to monitor and store BLER and received mean power.			
[MAE-D6-1-T-REQ-054]	The MAESTRO UE shall be able to monitor and store the IP packet error rate.			
[MAE-D6-1-T-REQ-043]	The MAESTRO UE shall be able to keep track of the incoming data rate at the IP level.			
[MAE-D6-1-T-REQ-111]	The MAESTRO UE shall have a radio sensitivity level similar or better than -117dBm as defined in 3GPP TS 25.101.			
	<b>6.2 Propagation Channel Emulator requirements</b>			
[MAE-D6-1-T-REQ-019]	The propagation channel emulator must interface with a Node B, a terminal or an on-channel repeater.			
[MAE-D6-1-T-REQ-020]	The propagation channel emulator must interface with the other components of the system in the following frequency range (GHz): $2.11 \leq f \leq 2.17$ .			
[MAE-D6-1-T-REQ-041]	The propagation channel emulator shall emulate the following links: <ul style="list-style-type: none"> <li>- Satellite to UE</li> <li>- Satellite to IMR</li> <li>- IMR to UE</li> </ul>			
[MAE-D6-1-T-REQ-021]	The propagation channel emulator must be able to support multi-path fading.			
[MAE-D6-1-T-REQ-042]	The propagation emulator channel shall provide non linearity impairments.			
	<b>6.3 IMR requirements</b>			

Ref #	Requirement [D6-1.2b]	Validation (Lab/Field)	Trial Scenario Ref #	Comments
[MAE-D6-1-T-REQ-023]	The on-channel repeater shall transmit the same signal as the one received.			
[MAE-D6-1-T-REQ-024]	The on-channel repeater shall operate in the UMTS frequency range: 2.11GHz <= F <= 2.17GHz.			
[MAE-D6-1-T-REQ-025]	The I/O power level of the on-channel repeater shall be: - Minimum input power: - Maximum output power: -25dBm for laboratory testbed			
[MAE-D6-1-T-REQ-026]	Propagation delay through the on-channel repeater shall be 6.4µs.			
	<b>6.4 HUB requirements</b>			
[MAE-D6-1-T-REQ-028]	The Hub shall be composed of a node B and an RNC simulator.			
[MAE-D6-1-T-REQ-038]	The Hub shall be able to generate multiple S-CCPCH channels to allow interference performances measurements at the terminal.			
[MAE-D6-1-T-REQ-030]	The Node B shall output data over a 3GPP standardised UTRA FDD W-CDMA carrier.			
[MAE-D6-1-T-REQ-078]	The Node B shall operate in the UMTS frequency range: 2.11GHz<=F<=2.17GHz.			
[MAE-D6-1-T-REQ-032]	The Node B shall comply to the 3GPP specifications described in TS 25.104			
[MAE-D6-1-T-REQ-029]	The Node B shall interface on one side with the propagation channel emulator and on the other side with the RNC simulator.			
[MAE-D6-1-T-REQ-072]	The RNC simulator shall interface on one side with the Node B and on the other side with the BM-SC from which it receives data to broadcast.			
[MAE-D6-1-T-REQ-035]	The RNC simulator shall feature broadcast support adapted to the MAESTRO platform constraints.			
[MAE-D6-1-T-REQ-047]	The RNC simulator shall configure a FACH user rate of 384 kbps.			
[MAE-D6-1-T-REQ-036]	The RNC simulator shall include an internal data generator used to generate extra S-CCPCH.			
[MAE-D6-1-T-REQ-049]	The RNC shall be able to receive packet over an ethernet interface.			
[MAE-D6-1-T-REQ-051]	The RNC simulator shall feature a simplified user interface to modify parameters such as: - SIB content - Node B configuration parameters - Internal parameters (eg: name of the source file to transmit, ...)			
[MAE-D6-1-T-REQ-108]	The RNC shall maintain one IP address per CTCH. The IP address value will be received from the BM-SC.			
[MAE-D6-1-T-REQ-037]	The RNC simulator shall send the SDMB-specific data required for FACH configuration of the UE within the system information 3.			

<i>Ref #</i>	<i>Requirement [D6-1.2b]</i>	<i>Validation (Lab/Field)</i>	<i>Trial Scenario Ref #</i>	<i>Comments</i>
[MAE-D6-1-T-REQ-031 ]	The output power level of the Node B shall not exceed - 25dBm.			
	<b>6.5 Service centre requirements</b>			
[MAE-D6-1-T-REQ-107 ]	The service centre shall include: - a BM-SC emulator - a Push server - local streaming and web servers			
[MAE-D6-1-T-REQ-099 ]	The BM-SC shall be able to interface with the Hub via a dedicated or tunnelled connection.			
[MAE-D6-1-T-REQ-073 ]	The BM-SC shall be able to interface with the UE through the GPRS network.			
[MAE-D6-1-T-REQ-074 ]	The service centre shall implement the server side of : - Network layer functions - Transport layer functions - Application layer functions			
[MAE-D6-1-T-REQ-075 ]	The network layer functions of the BM-SC shall ensure: - Data confidentiality (data ciphering and key distribution) - Access of the BM-SC by only authorised UE			
[MAE-D6-1-T-REQ-076 ]	The transport layer functions of the Push server shall include: - Packet level FEC - Packet level interleaving - Carousel - Selective retransmission using either the SDMB or the GPRS networks			
[MAE-D6-1-T-REQ-077 ]	The BM-SC shall implement a multicast addressing scheme.			
[MAE-D6-1-T-REQ-085 ]	The BM-SC shall be able to transmit data using both the GPRS network and the SDMB network though the selection between the two networks does not need to be based upon audience or QoS criteria.			
[MAE-D6-1-T-REQ-089 ]	The BM-SC shall append a tag to every content to indicate whether it has to be distributed using download or streaming applications.			

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