IST Integrated Project No 507023 – MAESTRO

D6-3.2

UE SDMB specification document for Release 2

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Abstract:

This SDMB UE specifications document describes the UE procedures to both camp on a GPRS network and at the same time establish and maintain an SDMB connection over FACH, which is downlink only.

Keyword list: Maestro, UE, SDMB, Release 2, Dual-Mode, FACH, GPRS

EXECUTIVE SUMMARY

This document contains deliverable **D06-3.2** of the IST Integrated Project MAESTRO – Mobile Applications & sErvices based on Satellite and Terrestrial inteRwOrking (IST Integrated Project n° 507023).

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

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

This is the third of 8 tasks in Work Package 6 – "Architecture". The WP defines the functions and interfaces of SDMB all sub-systems namely user equipment, intermediate module repeater, space segment, hub and service centre.

The deliverable D6.3 – UE SDMB specification for Release 2 - describes the features required to be set or changed with respect to the existing 3GPP procedures, from a UE standpoint. Indeed, for the MAESTRO Release 2 test bed, a Motorola 3G handset is the starting point, to which changes will be brought, taking into account the scenarios to be demonstrated on the test bed, and the procedures to be changed accordingly.

The task is led by MSPS and is actively supported by LogicaCMG, UDCast, ASP and ERCOM as MAESTRO partners.

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DOCUMENT HISTORY

Vers.	Issue Date	Content and changes
0.1	01 October 2004	UE specifications for test bed Release 2
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1 INTRODUCTION

1.1 Background

The deliverable D6-3.2 – « UE SDMB specification for Release 2 » - is one of the deliverables of the task 6.3 « *User Equipment Specification»*

The task is led by MSPS.

This document includes the specifications of the Release 2 UE and the list of SDMB features that will be validated through the first MAESTRO test-bed release 2.

The overall structure of the document is as follows:

1. Introduction
2. Terms, Definitions, Abbreviated terms and Symbols
3. 3GPP to SDMB Release 2 UE Specifications
4. Detailed Requirements
5. Test Bed R2 Requirements
6. References

Chapter 3 describes the SDMB system from a UE point of view, the changes with respect to the 3GPP system, and derives the required changes to the UE implementation to reach an SDMB implementation.

Chapter 4 details an SDMB UE and trade-offs used to achieve an SDMB capable UE starting from a 3GPP-compliant one, as required for the test bed.

1.2 Fields of application

This document is applicable to the design of the second MAESTRO test-bed release. It is not applicable to the UE to be depicted in the scope of the SDMB commercial system. Indeed such an UE would be based on MBMS standard as described in D3.1- “SDMB Access Layer Definition” document.

2 TERMS, DEFINITIONS, ABBREVIATED TERMS AND SYMBOLS

2.1 Terminology and definitions

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 service	A service 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.
Mobile IP datacast 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. It includes streaming, download as well as groupcast services.
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 service	A service that delivers some multimedia content with real time constraints. It may refer 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 in the UE.

2.2 Abbreviations

2G / 3G	2nd / 3rd Generation
3GPP	3rd Generation Partnership Project
AC	Admission Control
ACK	ACKnowledged
AM	Acknowledged Mode
APN	Access Point Name
ARQ	Automatic Repeat request
B/M	Broadcast/Multicast
BCCH	Broadcast Control Channel (logical control channel)
BCH	Broadcast Channel (transport channel)
BE	Best Effort
BER	Bit Error Ratio
BLER	Block Error Ratio
BM Client	Broadcast/Multicast Client
BMC	Broadcast/Multicast Control
BM-SC	Broadcast Multicast Service Center in MBMS
BO	Buffer Occupancy
BS	Base Station
CAC	Call Admission Control
CB	Cell Broadcast
CBS	Cell Broadcast Service
CCCH	Common Control Channel
CCTrCH	Coded Composite Transport Channel
CDMA	Code Division Multiple Access
CN	Core Network
C-PHY	Primitives for the control of the configuration of the physical layer
CPICH	Common Pilot Channel
CRC	Cyclic Redundancy Check
CRLC	Control RLC
CRNTI	Control RNTI
CTCH	Common Traffic Channel
CTCH-BS	Common Traffic Channel Block Set
DCCH	Dedicated Control Channel (logical channel)
DCH	Dedicated Channel (transport channel)
DL	Downlink
DRX	Discontinuous Reception
DSCH	Downlink Shared Channel
DTCH	Dedicated Transport Channel
Eb/No	Energy per Bit over Noise power density ratio
Ec/No	Energy per chip over Noise power density ratio
ESA	European Space Agency
ETSI	European Telecommunications Standards Institute
FACH	Forward Access Channel

FDD	Frequency Division Duplex (UMTS mode)
FEC	Forward Error Correction
FES	Fixed Earth Station
FIFO	First In First Out
FL	Forward Link
FSM	Finite State Machine
GEO	Geo-stationary Earth Orbit
GGSN	Gateway GPRS Support Node
GoS	Grade of Service
GPRS	General Packet Radio Service
GSM	Global System for Mobile communications
GSN	GPRS Support Node
GW	Gateway
HC	Handover Control
HFN	Hyper Frame Number
HLR	Home Location Register
ID	Identity
IE	Information Element
IETF	Internet Engineering Task Force
IMR	Intermediate Module Repeater
IMSI	International Mobile Subscriber Identity
IP	Internet Protocol
IPv4	Internet Protocol version 4
IPv6	Internet Protocol version 6
Kbps	Kilo bits per second
L1	Layer 1
L2	Layer 2
L3	Layer 3
LC	Load Control
LI	Length Indicator
LLr	Linked List of addresses of packets to be re-emitted
MAC	Medium Access Control
MAC-b	Medium Access Control broadcast
MAC-c	Medium Access Control common
MAC-d	Medium Access Control dedicated
MAC-sh	Medium Access Control shared
MBMS	Multimedia Broadcast Multicast Services
Mbps	Mega bits per second
Mcps	Mega chips per second
MCCH	MBMS point-to-multipoint Control Channel
MICH	MBMS notification Indicator Channel
MLP	MAC Logical channel Priority
MS	Mobile Station

MT	Mobile Terminal
MTCH	MBMS point-to-multipoint Traffic Channel
MUI	Message Unit Identifier
NAS	Non Access Stratum
NBAP	Node B Application Protocol
NI	Notification Indicator
NRT	Non Real Time
OVSF	Orthogonal Variable Spreading Factor
PC	Power Control
P-CCPCH	Primary Common Control Physical Channel
PCH	Paging Channel
P-CPICH	Primary Common PIlot Channel
PDCP	Packet Data Convergence Protocol
PDP	Packet Data Protocol
PDU	Packet Data Unit
PHY	PHYsical layer
PI	Page Indicator
PICH	Paging Indicator Channel
PLMN	Public Land Mobile Network
PN	Pseudo Noise
PS	Packet Switched
PS	Packet Scheduler
PSC	Primary Synchronization Code
p-t-p	Point-to-Point
p-t-m	Point-to-Multipoint
QoS	Quality of Service
RAB	Radio Access Bearer
RAN	Radio Access Network
RANAP	RAN Application Part
RB	Radio Bearer
RBAM	Radio Bearer Allocation and Mapping
Req.	Request
RL	Return Link
RLC	Radio Link Control
RM	Resource Management
RNC	Radio Network Controller
RNTI	Radio Network Temporary Identity
RRC	Radio Resource Control
RRM	Radio Resource Management
RT	Real Time
Rx	Receive
SAP	Service Access Point
Sat	Satellite

SATIN	SATellite UMTS IP-based Network
SCCP	Signalling Connection Control Part
S-CCPCH	Secondary Common Control Channel
SCH	Synchronisation Channel
SDU	Service Data Unit
SF	Spreading Factor
SFN	System Frame Number
SGSN	Serving GPRS Support Node
SI	Status Indicator
SIB	System Information Block
SNI	Secondary Notification Indicator
S-UMTS	Satellite UMTS
SW-CDMA	Satellite Wideband CDMA
T	Terrestrial
TB	Transport Block
TBS	Transport Block Set
TCTF	Transport Channel Type Field
TE	Terminal Equipment
TFC	Transport Format Combination
TFCI	Transport Format Combination Indicator
TFCS	Transport Format Combination Set
TFI	Transport Format Indicator
TFS	Transport Format Set
TM	Transparent Mode
TMGI	Temporary Multicast Group Identifier
TMSI	Temporary Mobile Subscriber Identity
TPC	Transmit Power Control
TrCH	Transport Channel
TSTP	Time Stamp
TTI	Transmission Time Interval
T-UMTS	Terrestrial UMTS
TV	Virtual spacing Time
Tx	Transmit
UDP	User Datagram Protocol
UE	User Equipment
UM	Unacknowledged Mode
UMTS	Universal Mobile Telecommunications System
U-plane	User plane
U-RNTI	UTRAN RNTI
UTRA	UMTS Terrestrial Radio Access (ETSI)
UTRA	Universal Terrestrial Radio Access (3GPP)
UTRAN	UMTS Terrestrial Radio Access Network
WCDMA	Wideband CDMA

WFQ	Weighted Fair Queuing

3 3GPP TO SDMB RELEASE 2 UE SPECIFICATIONS

For Test Bed release 2, UE SDMB specifications are an “add-on” over a 3GPP release 99 UE. To perform an SDMB download, some 3GPP features will be inhibited, and others will be slightly modified, as described in section 5. Features like FEC, Carrousseling and data retransmission are completely new to 3GPP release 99.

Internal modifications will be brought to the UE in such a way that for the Test Bed release 2, the UE will not be fully 3GPP compliant anymore.

3.1 System Decomposition (Motorola, UDCast, Logica)

3.1.1 3GPP R99 architecture (Motorola)

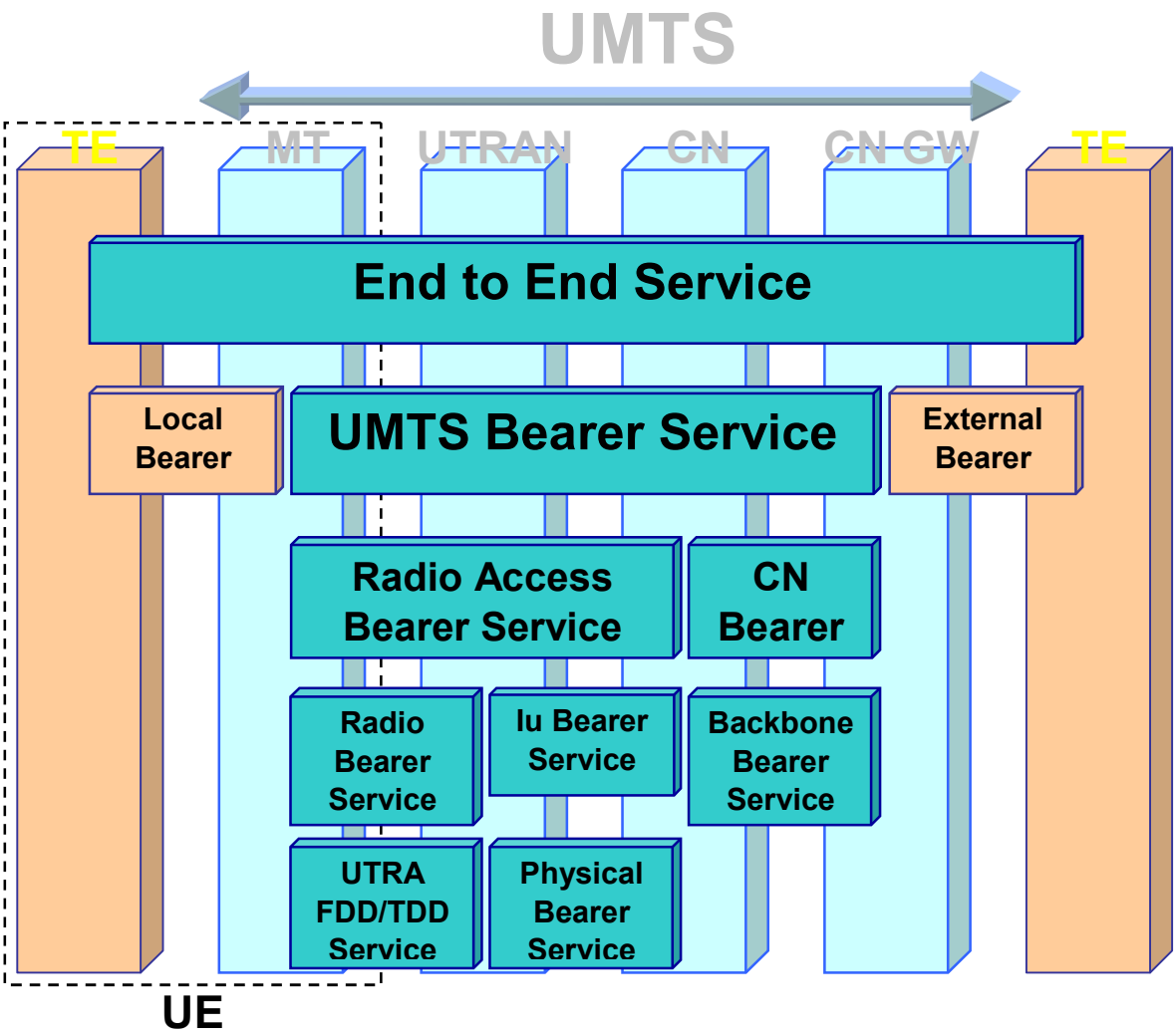

Figure 1 UMTS Reference Architecture

Figure 1 describes the UMTS reference architecture. Details of equipment involved in the UE are defined below. This document addresses the impacts brought to this architecture in the scope of the MAESTRO Release 2 test bed implementation. More specifically, the following section will describe the UE layers role and responsibilities. The next section shows how the Release 2 Test Bed requirements impact the existing 3GPP UE layers and Uu interface.

Note that section 5 goes into details of the MT-TE interface as it is specific to the Test Bed Release 2 devices and implementation constraints.

3.1.2 UE decomposition (Logica, UDCast, Motorola)

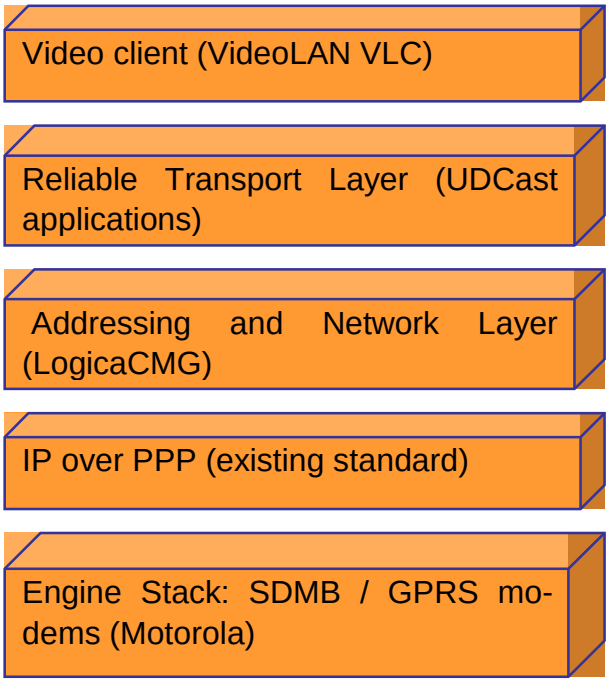

Figure 2 UE module decomposition

Figure 2 is a reminder of the UE SDMB Release 2 functional architecture, as described in [AD9]:

- The UE engine stack provides the IP stack with a 3GPP based data carrying service – alternatively downlink only through SDMB and full duplex through GPRS . Thus, both specific scheduling constraints of SDMB and the usual 3GPP scheduling constraints of the GPRS Network monitoring and data transfer must be handled.
- On top of the IP stack, the network layer provides addressing management, ciphering/deciphering and QoS monitoring features. It also contains an independent authentication sub-module.

- The out coming user data is processed by a reliable transport channel module, based on redundancy techniques. They are currently introduced in the MBMS standard.

The sections 3.2 to 3.5 go into details, for each module mentioned above, of the roles and responsibilities they play in the system, and the impact they have on the 3GPP standards if any. These sections also show which of the requirements given in [AD10] are covered by the module described.

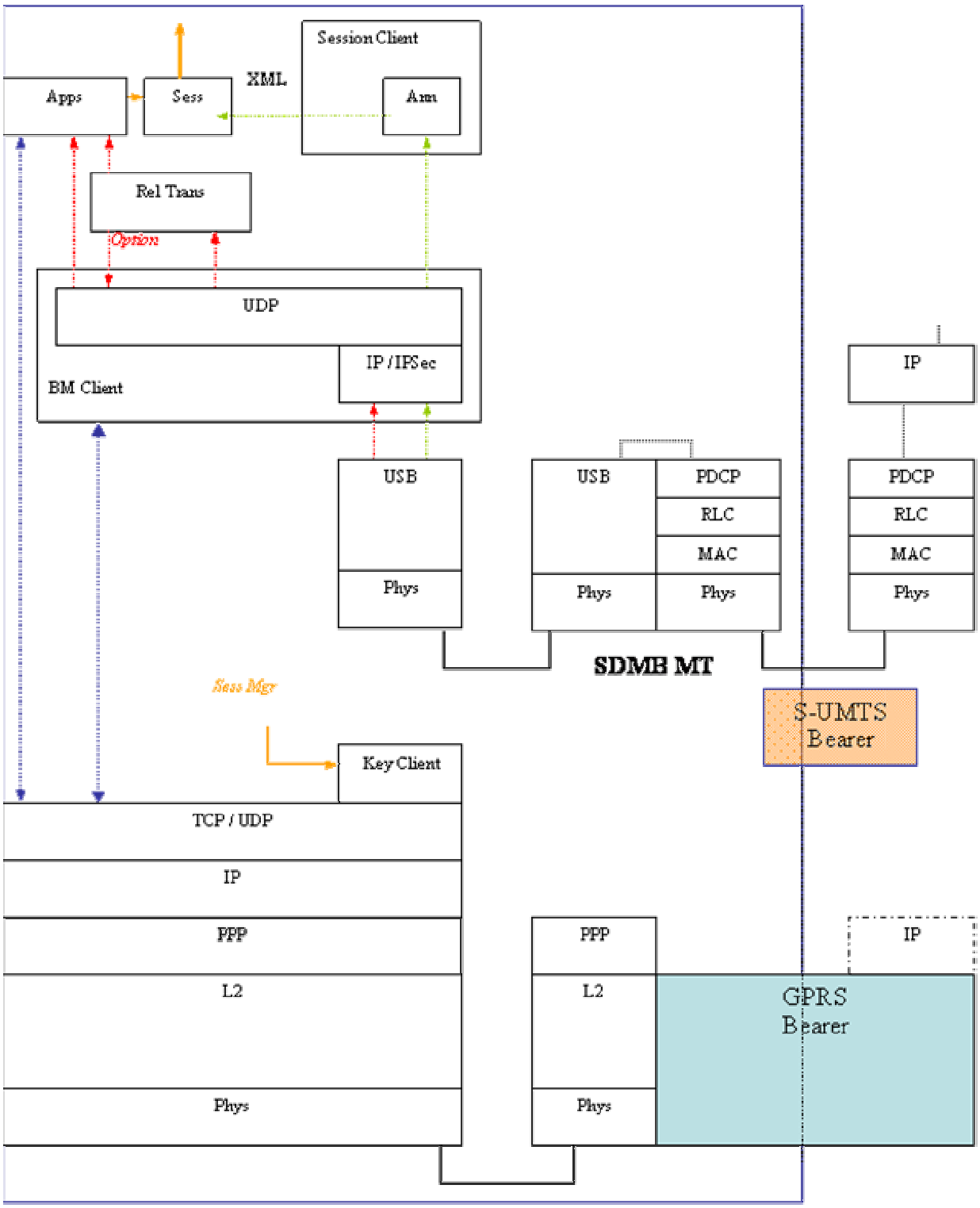

Figure 3 UE detailed layer decomposition

Figure 3 shows the system from an OSI layer perspective. It highlights the protocols underlying the modules shown on Figure 2:

- The engine module embeds the whole access stratum of the Dual Mode SDMB stack. That is for the 2G only part, the signal processing, L1, RLC/RR, SNDCP. On the other hand, for the 3G only part, the WCDMA signal processing, L1 and RLC/RRC, PDCP. Part of the dual mode features defined in 3GPP at L1 and RRC/RR level will be frozen in SDMB prototyping for release 2 test bed since they are irrelevant to the release 2 test bed requirements.
  The MM/GMM, SM layers are common to 2G/3G procedures. At PDCP/SCDCP level, IP packet data is encapsulated in PPP packets. The presence of the PPP over USB link is a release 2 Test Bed specific constraint. In the commercial specification, the packet data should be processed by the IP/UDP stack directly.
- The Broadcast/Multicast Client (BM Client) handles the IP packets coming out of PPP over USB stack. The processing done by this client is described in section 3.4 below.

3.2 Streaming Application Client

3.2.1 Role and responsibilities

The streaming application client will be VideoLAN VLC. It will be responsible for playing the media streams that are multicast over the test bed system from the content server(s).

3.2.2 Impacts on the standards

VideoLAN is a free software that can be downloaded from the web at videolan.org.

3.3 Reliable Transport Layer (UDCast)

3.3.1 Role and responsibilities

The Reliable transport layer (RMTCli) is in charge of re-building the stream that has been protected by a FEC and interleaving mechanism (for live streaming). For push & store mechanism, it is also in charge of storing content before decoding in order to fill potentially large holes introduced by the packet erasure link. The filling is done through multiple passes (carrousel) or selective retransmission via interactive terrestrial link.

UDcast will provide the following software components to be deployed on the TE:

- RMT Application Client Software

  The RMT Application Client is a software component which will support the following reliable layer functionality:

  - Processing of new session/content

    The application will be informed when a new session is coming thanks to the announcements sent before and during the session. It

will then perform processing of the session by sending a message to the end-user application. This end-user application is described after. The decision may be ACCEPT or REFUSE the new content

- o Processing of received content

  The application will be informed when a new accepted content has been received, for instance after a number of carrousel and/or re-transmissions. It will then process the new content and move it to a specific directory.

- o End a session

  The application will be also able to process the end of an on-going application.

- RMT session application:

  The RMT session application is a software component that will be able to manage new/existing sessions by listening to a control group to control messages and announcements. It will perform:

  - o New session announcement

    The session application is in charge of processing new content. When a new session is informed, the application will inform the RMT application and wait for the subsequent decision. If the decision is ACCEPT then the session manager configures other processes (see RMT decoder).

  - o Managing back up mechanism

    The session is able to take decisions as if new packets are to be asked to the server (selective retransmissions). It will forward any new redundant packet to the reliable decoder.

  - o Managing session existence

    It may be possible that the session is ended prematurely by the application, failures… The session manager will then inform the underlying decoder layers that the session has ended.

- RMT decoder application:

  The RMT decoder application will reconstruct frames based on received DATA packets and FEC packets..

  - o Store DATA & FEC packets

These information are stored in a MATRIX either with 1-pass mechanism (streaming and hot download) or with multiple pass mechanism (carrousel and terrestrial back up).

  - o Decode frames

    The decoder will use different CODEC depending on the type of service. For P&S we will use a perfect systematic code (BCH). For

streaming we will use mono-dimensional Reed-Solomon. Non systematic codes like LDPC still to be decided.

- o Inform session manager

  The decoder will wait for the session manager before it starts decoding. As a matter of fact, if too many packets are missing, the full frame is lost, incurring a lot of missed ADU. So a careful communication must be established between 2 processes.

- End user application:

  The end user Application Client is a software component which will support the following support functionality:

  - o Pop up messages

    The end user will be polled to know if the new advertised content has any interest to him. If YES or if the content is mandatory, the RMT layer will be configured to process the content

  - o Reception of new content:

    When a new content has been correctly received, it will be moved to a “hot folder” where a specific application will be launched, for instance a VLC client

    When a new streaming session has started, the corresponding VLC client will be launched. An IGMP join also will be issued.

All these applications are presented in Figure 4.

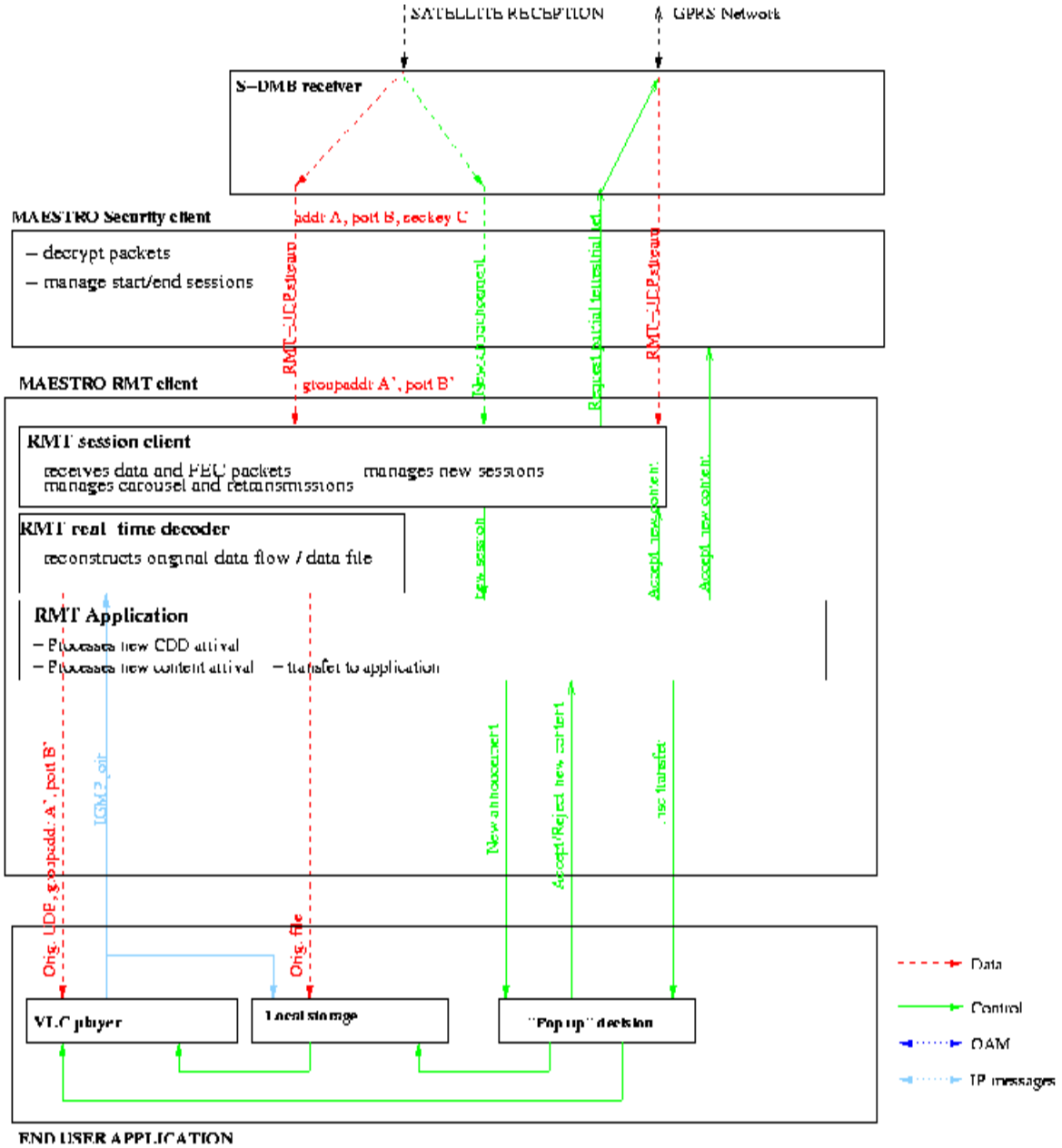

Figure 4: RMT applications

3.3.2 Impacts on the standards

The RMT clients use modified UDP payloads to implement the codec used in DVB-H standard (Reed-Solomon). The ports numbers will be modified accordingly to accommodate the implementation on the Windows PC. If a 3GPP defined CODEC is used then we will implement the chosen one, if possible.

The Session announcements format is yet to be defined. It MAY be possible to use SDP/SAP/FLUTE type of announcements.

3.4 Addressing and Network Layer (LogicaCMG)

3.4.1 Role and responsibilities

LogicaCMG will provide the following software components to be deployed on the TE:

- BM Client Software

  The BM Client is a software component which will support the following network layer functionality:

  - User authentication

    The BM client will support the necessary functionality to allow the SDMB 'User' using the TE to request a PKI certificate and the necessary public and private keys and store these securely on the TE. This will ensure that all management exchanges between each TE and the BM-SC will be mutually authenticated. This element of the BM Client will not interact with any other partner software on the TE.

  - Content deciphering

    The BM client provides the necessary functionality to decipher the content accessed over the SDMB system using keys provided by the Key Client software (see below) and pass this content to the UDCast reliable transport client application.

- Key Client

  The Key Client is a software component that will provide user authorisation functionality and the ability to download ciphering keys.

  - User Authorisation

    The Key Client provides the functionality to respond to user requests for a service by sending a request to the BM-SC for permission to access to the service. User requests for service will be communicated to the Key Client by the UDCast session manager (XML interface assumed).

  - Key Download

    If the service access request is authorised, the key client downloads the necessary ciphering keys and stores them in a secure key store where they can be accessed by the BM client in order to decipher the service data.

  In both of the above processes, the Key Client uses the PKI certificate and keys generated by the BM client in order to authenticate itself in the messages it sends to the BM-SC and also to authenticate that the messages it receives are from the BM-SC.

- Session Client

The Session client is a software application that receives announcement messages transmitted by the BM-SC and which have been broadcast over the test bed network to the TE. The Session client processes the announcement data into a format suitable to be passed to the UDCast session manager (again XML interface is assumed). The announcement data basically consists of the CDD information originally generated by the UDCast server application.

3.4.2 Impacts on the standards

The BM Client generates PKI certificates formatted according to the Internet X.509 profile defined in RFC 3280 and signed using the DSA1 algorithm defined in RFC 3279. It also performs IPSec compliant deciphering of ciphered content (see RFCs 2402 and 2406).

The Key Client implements the IETF GSAKMP standard.

The Session Client has been implemented using a proprietary announcement format that can easily accommodate the CDD requirements.

3.5 SDMB Release 2 Engine Stack (Motorola)

The starting point for all UE test bed release 2 specification is a 3GPP Release 99 compliant UE. The UE specification for test bed release 2 is therefore described in terms of delta. References to the specifications are given when necessary.

3.5.1 Role and responsibilities

The SDMB release 2 stack roles can be split the following way:

Role 1: It hosts a downlink only SDMB signal receiver, based on slight 3G stack modifications of a 3GPP release 99 compliant commercial UE. The goal is to keep these modifications as little as possible in order to reduce the potential implementation effort of SDMB features in a future 3GPP phone.

Role 2: The main functionality of the UE is still its 3GPP usual activities. In the scope of test bed release 2, they are reduced to registering on a 2G PLMN, selecting a cell, camping on it in GPRS Idle mode.

a. Once this is achieved, between two paging blocks, instead of saving battery lifetime, the UE shall proceed as an SDMB signal receiver, i.e. it should download SDMB data broadcast by satellite/IMR as long as possible.

b. The UE shall also perform its usual neighbour cell monitoring procedures: power measurements, sys info decode, etc…

Role 3: When a 2G incoming call occurs, the UE shall stop all SDMB activities and indicate to the user by a tone that an incoming call has been trig-

gered. The call should not be handled by the UE in the scope of Test bed release 2.

Role 4: On trigger of the Reliable Transport Layer, the UE shall be able to interrupt all SDMB activity and establish a data transfer with the 2G network. The purpose of this data transfer is to request the content provider database shared between terrestrial and satellite network to retransmit the packets that were lost during satellite transmission.

3.5.2 Impacts on the standards

3.5.2.1 Engine stack overview

Figure 4 gives an example of 3GPP dual mode engine stack architecture. It represents 2G and 3G modules separately, although design and implementation can clearly assume in one module the both RAT functionalities.

The sections below go into details of the four engine stack roles listed above.

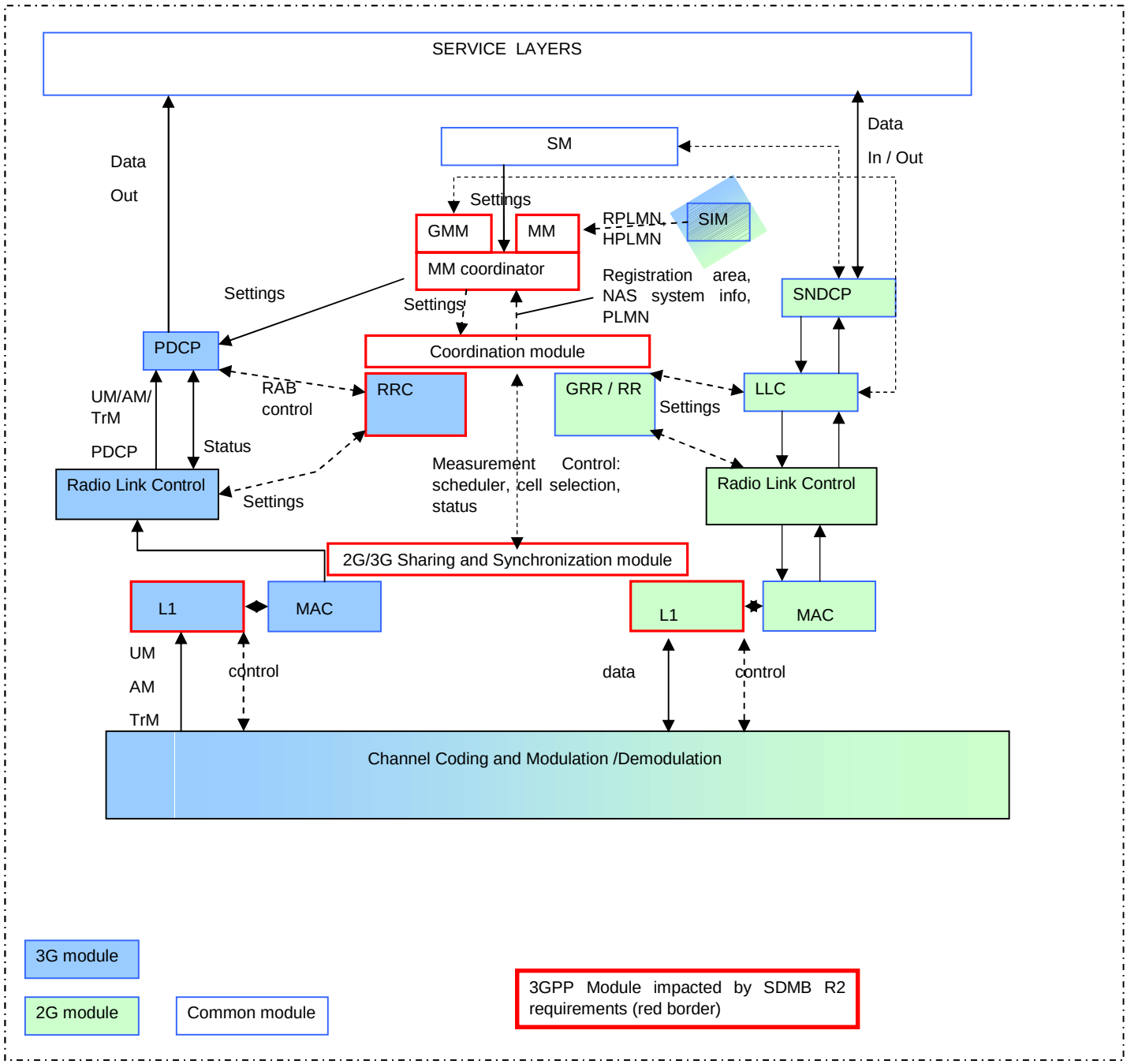

Figure 5 UE 2G/3G module decomposition

It is interesting to separate 2G and 3G modules to point out what specific 2G or 3G module the Test Bed Release 2 specifications impacts. The synchronization modules between 2G-3G at L1 and RR level must be changed. For instance, any 2G monitoring when in 3G is useless, since the 3G has been modified to download SDMB only purposes. Also, any inter RAT cell reselection or handover must be frozen. On the other hand the synchronization modules need to be modified in order to activate SDMB download processing during 2G low processing periods.

3.5.2.2 SDMB signal receiver: modified 3G stack modules

The 3G stack modifications to achieve an SDMB signal receiver feature for the SDMB release 2 UE are close to those made for SDMB release 1 UE from a single mode point of view.

From a dual mode point of view, possible dual mode transitions for the 3GPP Release 99 UE are:

- In UTRA Idle (PCH state)
  - Autonomous reselection
  - PLMN scan when HPLMN is found on GSM RAT
- In UTRA FACH (FACH state)
  - Autonomous reselection
  - Cell Change Order to GSM

2G Neighbors cells measurements, synchronization and system information decoding are done accordingly by the 3G stack modules.

Also, a main requirement for UE SDMB release 2 specification is that the UE remains in GPRS Idle mode while doing SDMB data download. As the UE cannot be attached on both a 2G and a 3G network, the MM layer handling attach procedures must be modified.

Therefore, two major differences must be highlighted:

1) All dual mode processing usually done when camped on a 3G cell regarding 2G networks must be inhibited in the UE SDMB release 2 context.
2) The UE will not be attached like on a 3G cell/network. It will camp on a 2G GPRS network. Therefore a fake mechanism will be involved in order to configure the 3G SDMB stack “as if PS attached” and trigger the data downlink only transfer. However, the single mode RRC/RLC/L1 configuration shall be handled the same way as for SDMB release 1.

As a reminder, the following lines summarize what has been described in the UE specification for release 1. Please refer to **[AD6]**. Also, the detailed trade-off between the existing (3GPP) system and SDMB as required for Release1 has been detailed in **[AD7].**

In the MAESTRO test bed R1, the starting system is a 3GPP compliant UE On the MT side, the Uu interface will be modified in order to receive data broadcast on an SDMB cell. Use of only the downlink path of the UTRAN will be made. The serving cell shall provide the required channels for the UE to camp and perform attach. These channels are listed on Figure 7.

Subsequently, the UE will be able to decode the primary common control channel (P-CCPCH) which carries the System Information Blocks (SIB) embedded into the broadcast control channel (BCCH). The SIB information will allow to decode data transmitted over the forward access channel (FACH). Figure 6 shows the 3GPP channel mapping that is specified in **[AD5].**

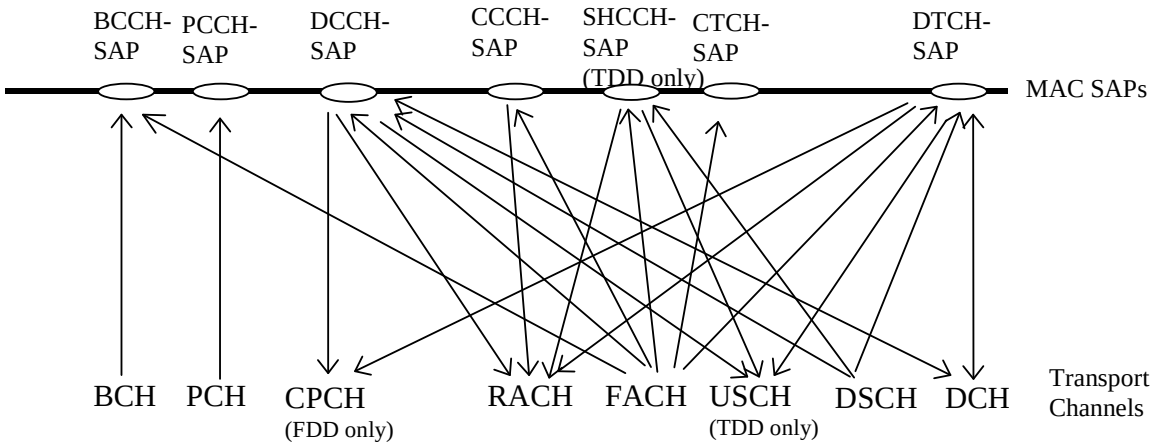

Figure 6 Logical channels mapped onto transport channels, UE side

However, for the SDMB R1 test bed, most of these channels will not be used because:

- SDMB traffic and signalling is downlink-only in nature, meaning that all 3GPP uplink channels are not relevant
- SDMB traffic is broadcast, meaning that all 3GPP dedicated downlink channels will not be used.

Instead, the channel mapping given on Figure 7 has been proposed as optimal for the SDMB broadcast.

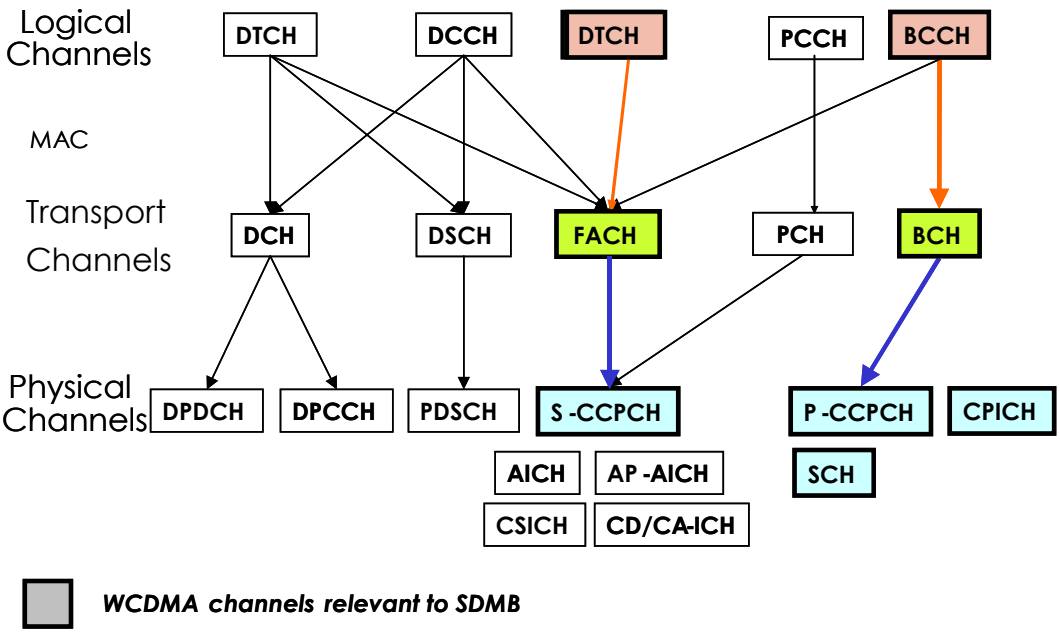

Figure 7 UMTS channels and relevance to SDMB test bed R1 Data transfer on the RLC UM SAP will transit via the DTCH on the FACH which is then mapped on the S-CCPCH on the physical layer to be sent on the air.

Once the UE is synchronized on the SDMB cell, all signalling will be sent on the BCCH via SIB. The main modification brought into the Uu interface will be the introduction of a series of SIB fields that will be needed to configure the UE via an indexed method.

As SDMB for test bed release 1 aims at doing a downlink packet transfer, the user plane will be impacted as well as the control plane. Our approach is to reuse as much as possible the existing 3GPP procedures from a UE standpoint. The main SDMB limitation is the lack of uplink return channel; hence, internal agents added to existing 3GPP modules in the UE will simulate both the generation of uplink messages and the reception of downlink messages such as RRC connection setup. Thus, the absence of a return link will be transparent to the UE, behaving as if a usual 3GPP procedure was ongoing.

The 3GPP layers that are impacted by the changes to 3GPP due to SDMB release 1 requirements are therefore:

- On both user and control plane: Physical Layer, MAC. The channel mapping of FACH on DTCH mentioned above is not described in the specifications, although it is not explicitly prohibited
- On the user plane: RLC needs no modification as per 3GPP. RLC will run in transparent mode for signalling and unacknowledged mode for the data transfer. Above RLC, PDCP needs no special modification.
- On the control plane: RRC hosts the major changes. As no specific module has been defined for SDMB release 1, it is planned to modify RRC in order to stub the RRC Connection Setup, the Radio Bearer Setup and PDP Context Activation. The configuration of L1/MAC and MM will follow as per 3GPP.

All the interfaces between these layers remain 3GPP compliant. Only procedures changes are introduced.

Regarding SDMB release 2, all interfaces and procedures related to Inter RAT processing are disabled. This mainly impacts RR coordination and L1/MAC synchronization modules shown on Figure 5.

3.5.2.3 MM/GMM modifications

The Mobility Management layer (MM) is built on top of the RR layer, and handles the functions that arise from the mobility of the subscriber, as well as the authentication and security aspects. Location management is concerned with the procedures that enable the system to know the current location of a powered-on mobile station so that incoming call routing can be completed.

The SDMB transfer shall not occur before the UE is attached to a terrestrial network. In the scope of release 2, the UE shall camp on a 2G network. It shall be configured accordingly, so that the outcome of the power up, PLMN scan procedure, cell selection procedure and transition to idle mode is to camp on a 2G cell.

Between two DRX cycles if no power measurement or cell reselection occurs, the UE shall synchronize on a SDMB network and cell. The 3GPP specifications do not allow to be attached on two networks at the same time. Besides, trying to attach on a SDMB network while camped on a 2G cell would trigger a new PLMN scan which is not handled by the actual 3GPP L1 and RR state machines.

To handle the SDMB stack activity, an MM Maestro module (3M) must be created, next to the existing module in figure 4. The role of this entity would be to filter and route messages coming from Session Management layer or MM 2G-3G coordination requests. For instance, once the SDMB stack has been activated, the MM Maestro module shall route any PDP context activation request coming from SM to the SDMB stack. The SDMB stack then executes the release 1 scenario specified in D6-3.1, and proceeds with a SDMB data transfer as long as no 2G paging or monitoring occurs.

The 2G/3G coordination modules in MM/RR/L1 also need to be modified. The SDMB processing shall be transparent to the phone at RR and L1 level. The only layers which have knowledge of the dual SDMB-2G coexistence are MM and above.

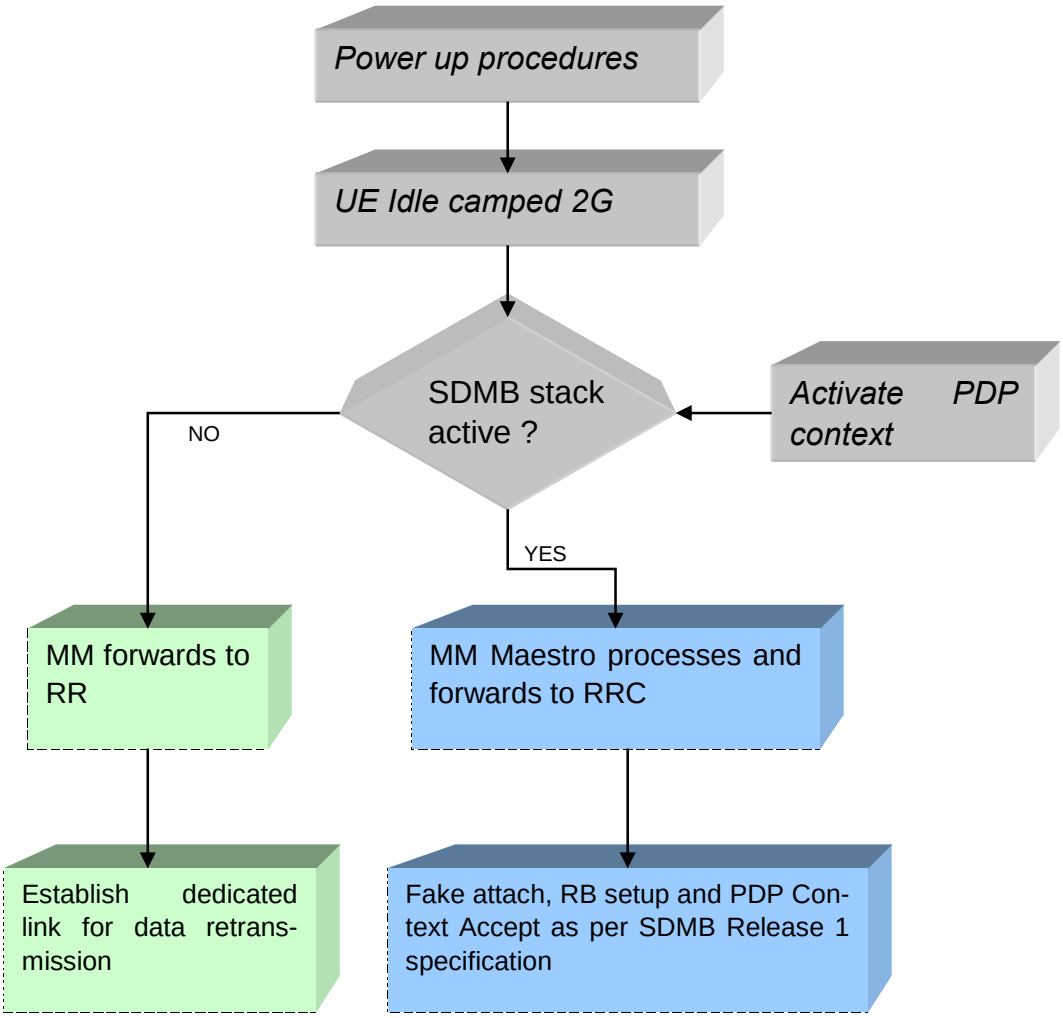

Figure 8 SDMB release 2 activity diagram

Figure 7 gives an instance of what decision needs to be made when a PDP Activate Context request occurs at MM level.

The MM Maestro module aims at routing SDMB related messages to the SDMB stack when SDMB stack is active.

3.5.2.4 GPRS idle mode capability

3.5.2.4.1 Idle Mode environment

This section focuses on the actual GSM 3GPP compliant activity set that the SDMB release 2 UE will execute in the scope of Test Bed release 2. Basically, the UE's GSM activity is compliant to the release 97 specifications in GSM/GPRS Idle mode. The goal of listing these is to capture the potential "no processing" periods when the UE can do SDMB downloads. For more details on each point mentioned, please refer to 3GPP specifications.

There are 4 different phases in the Idle Mode lifetime of the UE:

- Camped phase (camped on a cell, listens to its paging sub channel, monitors neighboring cells)
- Reselection (perform cell reselection, camp on a cell after having released a dedicated channel)
- RACH (establishment of a dedicated channel): this will not occur as long as SDMB stack is active.
- PLMN search: in the scope of release 2, PLMN search shall be performed once at power up, or when any connection to the network is lost.

Another view to describe the IDLE mode activity is to list the main tasks performed by the UE:

- Serving cell management
- Neighboring cells management
- Reselection Management
- Establishment of a dedicated channel: does not occur if SDMB stack is active
- PLMN search: occurs once in most of the time
- Power saving management

To achieve these, the UE monitors mainly the following logical channels in IDLE Mode:

- FCH / SCH : Frequency / Synchronization CHannel :
- BCCH : Broadcast Control CHannel

- PCH : Paging CHannel
- AGCH : Access Grant CHannel
- CBCH : Cell Broadcast Channel

In the scope of release 2, the tasks of interest while camped as Idle 2G and doing SDMB download are serving cell, neighboring cells and reselection management.

3.5.2.4.2 Idle Mode Scheduler Principle

The 2G processing periods are identified below.

3.5.2.4.2.1 Serving cell management

- Measures RXLev of serving cell (measurements are made on each paging blocks).
- Listen to FCCH/SCH channels at least every 3 seconds.
- Listen to BCCH channel at least every 30 seconds.
- Listen to PCH channel:
- Normal paging: reads PCH block from the paging channel,
- Paging reorganization: listen to full CCCH and BCCH channels.
- Manages the downlink signalling failure (DSF) counter.
- Listen to CBCH channel.

Compute C1 and C2 criteria at least each 5 seconds.

Table 1 Serving Cells Actions

Actions	Module involved	Frequency
Power Measurement	L1	On each paging block
System Information (BCCH)	RR and L1	Every 30 seconds
Frequency Correction	L1	Every 3 seconds
Timing Synchro	L1	On each paging block

3.5.2.4.2.2 Neighboring cells management

- Measures RXLev of the RF carriers given by the network (BA list).
- Listen to FCCH/SCH channels (of the 6+ list) at least every 30 seconds.
- Listen to BCCH channel (of the 6+ list) at least every 5 minutes.
- Update the list of 6 strongest RF carriers (6+ list).
- Compute C1 and C2 criteria (for the 6+ list) at least each 5 seconds.

Table 2 Neighbor Cells Actions

Actions	Module involved	Frequency
Power Measurement	L1	According to network parameters. Located around the paging blocks
Frequency Synchro (FCH)	L1	When the cell enters in the 6 best cell group
SCH +BCCH decode	L1	Every 30 seconds
Refresh the 6 best cell group	L1	specific

Table 3 Reselection criteria

C1 : C1serving_cell < 0 (for 5 seconds)
C2 : C2adjacent_cell > C2serving_cell (for 5 seconds)
DSF : too many decode errors on PCH blocks
Cell Barred : serving cell becomes barred
PLMN changed : PLMN of the serving cell is not the HPLM

The information above shows that in IDLE mode, events frequency is very low (~ 1s for each paging block). The UE will use the idle time to do 3G SDMB content download.

3.5.2.4.3 Location updating and Paging

A powered-on UE is informed of an incoming call by a paging message sent over the PAGCH channel of a cell. Cells are grouped into *location areas*. Updating messages are required when moving between location areas, and mobile stations are paged in the cells of their current location area.

The enabling of periodic updating, and the time period between periodic updates, is controlled by the operator. If the UE does not register after the updating time period, it is deregistered.

A procedure related to location updating is the IMSI attach and detach. A detach lets the network know that the mobile station is unreachable, and avoids having to needlessly allocate channels and send paging messages. An attach is similar to a location update, and informs the system that the mobile is reachable again. The activation of IMSI attach/detach is up to the operator on an individual cell basis.

The DRX cycle defines the time between two paging block. It is typically of around 1 second. It is configurable by the network.

Upon paging indication, the UE will indicate to the user that an incoming call occurs. After indication, the incoming call will not be processed.

Once a paging indication has occurred, the UE shall stop all its SDMB download activity. The SDMB stack will need resynchronization with the satellite / IMR signal in order to proceed with the SDMB download.

3.5.2.5 SDMB to GPRS data transfer switch

Once the SDMB download is finished, the UE will establish a GPRS data transfer in order to retrieve the packets lost during SDMB data transfer. To do MM is informed that no SDMB data transfer shall occur during this procedure. A PDP context is established and forwarded by MM to the 2G modules. A dedicated traffic channel is established with the 2G network the UE was registered on. This procedure is fully 3GPP compliant.

4 DETAILED REQUIREMENTS (UDCAST, LOGICA, MOTOROLA)

For each module provided by the above partners, the following sections shall be filled in, if applicable.

4.1 Operational requirements

4.1.1 Transition between existing and new system

- UDCast (TE)
- Logica (TE)
- Motorola (MT)

The detailed trade-off between the existing (3GPP) system and SDMB as required for Release1 has been detailed in **[AD7].**

Scenario	*Existing System (3GPP)*	*New System (Release1)*
Cell selection and Camping	*Power Scan* *Selection of best cells* *PLMN scan*	*Identical to existing system*
Attach	*Location Update/Routing Area Update triggered by MM layer. Response from the network expected*	*Fake attach: MM message not sent. UE RRC to send reply to MM, including the TMSI value.*
RRC Connection Establishment	*RRC Connection Request primitive sent to UTRAN on RACH. RRC Connection Setup message sent on FACH to be able to configure the RLC,MAC and Layer1 sub-layers of the access layer in the UE.*	*SDMB RAN does not support RRC connection.* *Fake RRC Connection procedure: UE RRC sends an RRC CONNECTION SETUP message to itself, including hard-coded values necessary for configuring the access layer. RRC enters the CELL FACH state after reception of this message.*
Pipe establishment	*After receiving a Radio Bearer Setup message from the UTRAN, the UE RRC sends a CPDCP_CONFIG_REQ*	*The same CPDCP_CONFIG_REQ message will be sent to the PDCP layer using hard-coded values stored*

	message to the UE PDCP layer.	*in the UE.*
Data transfer	*Data is brought to application through the User Plane. The Service Class has triggered an Access Layer Configuration for streaming.*	*Data is brought to the application hosted by a PC through the Mobile. The Access Layer Configuration is not determined by the application. A pointer to a static configuration hosted by the Handset is sent out through System Information.*

Table 4 Existing system and Release1 system trade-offs

The detailed trade-off between the existing (3GPP) system and SDMB as required for Release 2 has been detailed in section 3.

Scenario	*Existing System (3GPP)*	*New System (Release 2)*
3G to 2G procedures	*Selection of best cells* *Inter RAT handover*	*Not handled in new system*
Camp	*Camp on 2G or 3G network according to Dual Mode 3GPP procedures and existing networks.*	*Camp on 2G network.*
PDP Context activation	*According to the RAT camped on, a PDP context will be established with the peer SM in the registered 2G or 3G network*	*According to whether SDMB modules are active or not, PDP context will trigger SDMB release 1 camp and data transfer scenario or be established with 2G network.*
SDMB Data transfer	*Usually between two DRX cycles, the UE will do power measurement, neighbor cells monitoring, etc…*	*On top of existing procedures, SDMB download will occur*

Table 5 Existing system and Release 2 system trade-offs

4.1.2 Operations preparation

4.1.2.1 Development system.

- UDCast (TE)

  The development system to be used for the TE of the Release2 test bed is the UDcast in-house configuration management system as used for the development of the commercial version of PUSH client and servers. This is based on CVS for versioning system and GNATS for bug tracking.

- Logica (TE)
- Motorola (TE)

  The development system to be used for the UE of the Release 2 test bed is the Motorola in-house configuration management system as used for the development of the commercial version of Motorola handsets.

4.1.2.2 Associated validation system

- UDCast (TE)

  The validation system to be used for the TE of the Release2 test bed is the system emulator developed in the frame of Maetsro.

- Logica (TE)
- Motorola (TE)

  The validation system to be used for the UE of the Release 2 test bed is the Motorola in-house systems.

4.1.2.3 Associated maintenance system

- UDCast (TE)

  Same as in 4.1.2.1

- Logica (TE)
- Motorola (TE)

  Same as in 4.1.2.1

4.1.3 Operability

4.1.3.1 General requirements for operability

- UDCast
- Logica (TE)
- Motorola (TE)

4.1.3.2 Ergonomics – human factors

- UDCast

  Operation and maintenance of the UE Terminal Equipment – the PC – (MT, TE or both ?) for this test bed will not require the presence of UDCast people .

  Once the PC is powered up, the necessary tools for data logging will run automatically.

  An application running on a PC (TE) will be in charge of monitorin, collecting and processing data received from the UE Mobile (MT) being used as a modem.

- Logica (TE)
- Motorola (TE)

  Operation and maintenance of the Terminal Equipment – the PC – for this test bed will require the presence of MSPS people in the MAESTRO.

  Once the phone is powered up when connected via cable to the PC, the necessary tools for data logging will run automatically.

  An application running on a PC (TE) will be in charge of collecting and processing data received from the Mobile (MT) being used as a modem. Once the application is started, no human interaction is required.

4.1.3.3 Observability and Monitoring

- UDCast (TE)

As stated in D6-1-2b, - “SDMB system technical requirements document”, the TE shall be able to

  - o To capture data from the MT for further processing (Reference MAE-D6-1-T-REQ-016
  - o To distinguish between downloaded & streamed content (MAE-D6-1-T-REQ-090)

- To store content (MAE-D6-1-T-REQ-086)
- To monitor and store BLER and received mean power measure on the UE (Reference MAE-D6-1-T-REQ-018)
- To monitor and store the IP packet error rate (MAE-D6-1-T-REQ-054)
- To keep track of the incoming data rate at the IP level (reference MAE-D6-1-T-REQ-043)

- Logica (TE)
- Motorola (TE)

As stated in D6-1-1 – "SDMB system technical requirements document", the UE shall be able:

- To keep track of the incoming data rate (**MAE-D6-1-T-REQ-043**)
- To monitor the BER, BLER and the received mean power (**MAE-D6-1-T-REQ-018**)
- To monitor the Packet error rate (**MAE-D6-1-T-REQ-054**)

4.1.4 Operation scenarios

- UDCast (TE)

The scenarios to be studied will be defined in **[AD9].**

- Logica (TE)
- Motorola (TE)

The scenarios to be studied will be defined in **[AD8].**

4.2 Functional requirements

4.2.1 Specification of the product states

- UDCast (TE)

The starting point is a commercial version of a DVB-H fec encoded adapted to the context of the MAESTRO system. The other starting point is the internal UDPush product already used in MODIS context.

- Logica (TE)
- Motorola (TE)

The starting point is a commercial version of a 3GPP-compliant Motorola handset that is adapted to be operational in the scope of the MAESTRO Release1 test bed. The state of the handset after these modifications (wrt 3GPP compliance) will not be verified, and it is therefore assumed that the handset will not be 3GPP compliant.

4.3 Performance requirements

- UDCast (TE)
  - MAE-D6-1.2b [MAE-D6-1-T-REQ-095] The transport layer FEC and inter-leaving shall be able to compen-sate 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-D6-1.2b [MAE-D6-1-T-REQ-097] The transport layer carouseling shall be able to compensate for long SDMB reception interrup-tions.

- Logica (TE)
- Motorola (TE)

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

The physical layer shall be able to provide a BLER less than or equal to 1% w.r.t. transmission impairments. This will be further analyzed for next releases 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 off, etc.

4.4 Capacity requirements

- UDCast (TE)

The maximum throughput will be of the order of 10 Mbps on the LAN (without the radio).

The maximum number of interleaved sessions will be 20.

- Logica (TE)
- Motorola (TE)

In the scope of release 1, it is expected from the terminal to support the decoding of a single FACH mapped into a single S-CCPCH. The maximum user data rate supported at the FACH level that includes the relevant UDP/IP/RLC/MAC headers is 384kbps.

In the scope of release 2, the maximum supported DRX cycle is 1,2 seconds on PBCCH and 2,1 seconds on CCCH.

4.5 Security Requirements

- UDCast (TE)

  N/A.

- Logica (TE)
- Motorola (TE)

  N/A.

4.6 Regulations requirements

- UDCast (TE)
- Logica (TE)
- Motorola (TE)

  FFS => WP8 ?

4.7 RAMS requirements

- UDCast (TE)

  N/A

- Logica (TE)
- Motorola (TE)

  N/A

4.8 Environment requirements

- UDCast (TE)
- Logica (TE)
- Motorola (TE)

  N/A

4.9 Design and Development requirements

4.9.1 Architecture

- UDCast (TE)

  The only constraint on the software architecture is that we are using W2K/NT implementation dereiving from in-house expertise in the

Linux/FreeBSD environment. Specific care should be taken as the way to support IP multicast stack in W2K. The use of different port numbers in RMT and SEC loops should ease.

- Logica (TE)
- Motorola (TE)

  The only constraint on the software architecture is that we are deriving the UE SDMB stack for Release 2 from the current 3G Motorola proprietary stack architecture.

4.9.2 Interfaces

- UDCast (TE)

  Signaling interfaces are defined with external products from LCMG using XML format (see AD11).

  Internal signaling is derived from standards and adapted to Maestro context. It is also disclosed in AD11.

- Logica (TE)
- Motorola (TE)

  Interfaces are defined internally and are Motorola Proprietary.

  Regarding release 1 procedures embedded in release 2, the UE-SDMB RAN interface is the UMTS WCDMA air interface, the UE only receiving SIB, and other signalling and data transfer channels as defined in [AD7].

  Regarding release 2 GSM procedures, the UE RAN interface is 3GPP compliant.

4.9.3 Reusability

- UDCast (TE)

The TE hardware is completely reusable throughout the different MAESTRO releases excluding the commercial release.

- Logica (TE)
- Motorola (TE)

  The UE hardware is completely reusable throughout the different MAESTRO releases excluding the commercial release.

4.9.4 S/W technologies and processes

- UDCast (TE)

The MAESTRO UDcast team will apply fully mature software development process that have been proven and validated in the UDcast Sophia Antipolis site.

- Logica (TE)
- Motorola (TE)

The MAESTRO MSPS team will apply fully mature software development process that have been proven and validated in the MSPS Toulouse site. In-house configuration management policies will be used. MSPS Toulouse site has been assessed at SEI CMM level 5 in December 2003.

4.9.5 Particular instructions for materials and procedures

- UDCast (TE)
- Logica (TE)
- Motorola (TE)

N/A

4.9.6 Robustness

- UDCast (TE)

TBC

- Logica (TE)
- Motorola (TE)

UE hardware and software have successfully passed 3GPP tests. They have gone through several operator chip acceptances.

4.9.7 Efficiency margins

- UDCast (TE)

N/A

- Logica (TE)
- Motorola (TE)

N/A

4.9.8 Expansion capability - Potential for additional services

- UDCast (TE)

  The TE will be able to support other CODEC when they are standardized.

- Logica (TE)
- Motorola (TE)

  The initial UE is dual-mode capable, meaning that it supports both GSM/GPRS and UMTS services. Support for additional services is not applicable to MAESTRO.

4.9.9 Portability

- UDCast (TE)

  The W2K software is developed using standard C code. It is expected to be portable to Pocket PC environment though this will not be tested.

- Logica (TE)
- Motorola (TE)

  N/A

4.9.10 Mechanical design

- UDCast (TE)

N/A

- Logica (TE)
- Motorola (TE)

  N/A

4.9.11 Electrical design

- UDCast (TE)

  N/A

- Logica (TE)
- Motorola (TE)

  N/A

4.9.12 Thermal design

- UDCast (TE)

N/A

- Logica (TE)
- Motorola (TE)

N/A

4.9.13 Production

- UDCast (TE)

N/A

- Logica (TE)
- Motorola (TE)

N/A

4.10 Integrated Logistic Support requirements

4.10.1 Test and trouble-shooting support equipment

- UDCast (TE)

UDcast MAESTRO team will use in-house testing equipment and validation.

- Logica (TE)
- Motorola (TE)

MSPS MAESTRO team will use in-house testing equipment and validation.

4.10.2 Deployment configuration requirements

- UDCast (TE)

The Udcast software hosted on the PC connected to thea MobilePC on the test bed will have a specific training for non UDCast people.

- Logica (TE)
- Motorola (TE)

The MSPS proprietary logging software hosted on the PC connected to the Mobile on the test bed will be monitored by trained MSPS team members.

4.10.3 Databases

- UDCast (TE)

N/A

- Logica (TE)
- Motorola (TE)

N/A

4.10.4 Packaging, handling, storage and transport

- UDCast (TE)

N/A

- Logica (TE)
- Motorola (TE)

N/A

4.10.5 Identification and labelling

- UDCast (TE)

N/A

- Logica (TE)
- Motorola (TE)

N/A

5 TEST BED R2 REQUIREMENTS

This chapter is intended to provide the test bed presentation with the overall test bed system presentation in the first part, with an emphasis on the UE specifications in the final part. In this section, we propose to detail the trade-offs implied in the SDMB Release 2 requirements versus 3GPP implementation, and then to describe the *ad hoc* solutions that have been adopted by the different WP6 partners as necessary for the practical realization of the Release 2 test bed. As a reminder from the MAESTRO technical annex the requirements for the SDMB Release 2 as depicted in the D6.3.2 are given below:

- SDMB broadcast while in GPRS stand-by mode

5.1 Applicability of the Commercial Product requirements to the Test Bed R1

There is no commercial product requirement as defined in [AD9] covered by the Release 2 test bed. The aim of the test bed is to prove the SDMB concept via the validation of:

- GPRS Idle camp
- Calibrate appropriate DRX period
- SDMB downlink only UE setup

In test bed R2, no UMTS idle mode procedures as specified in the commercial version of SDMB will be taken into consideration. The initial UE UMTS stack will be converted to an 'SDMB Release 2' stack.

The aim of the Release 2 test bed is therefore to demonstrate the feasibility of performing a download on the FACH without the return link, and validating the BLER and BER values, while executing GSM Idle mode procedures.

5.2 Test Bed R2 Trials overall requirements (Motorola, UDCast, Logica)

Two handsets will be used in order to implement the release 2 test bed scenario. The SDMB handset on one hand does the 2G idle activity, the SDMB download and the incoming call detection. The second GPRS handset is used for packet retransmission, once the SDMB download is completed.

Figure 8 shows where the MT and the TE stand in the overall Test Bed Release 2.

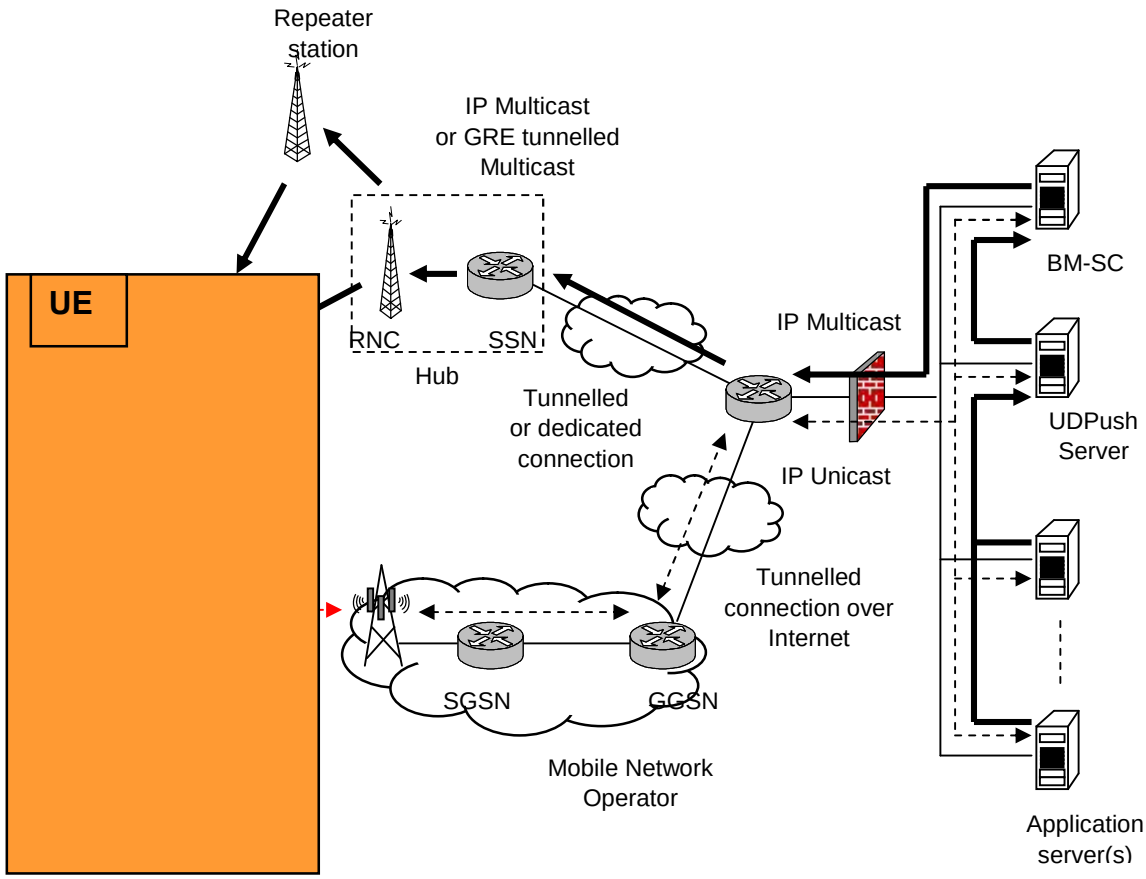

Figure 9 Test Bed R2 System

Figure 9 shows where the layers described in section 3 physically stand on Test Bed R2 equipments.

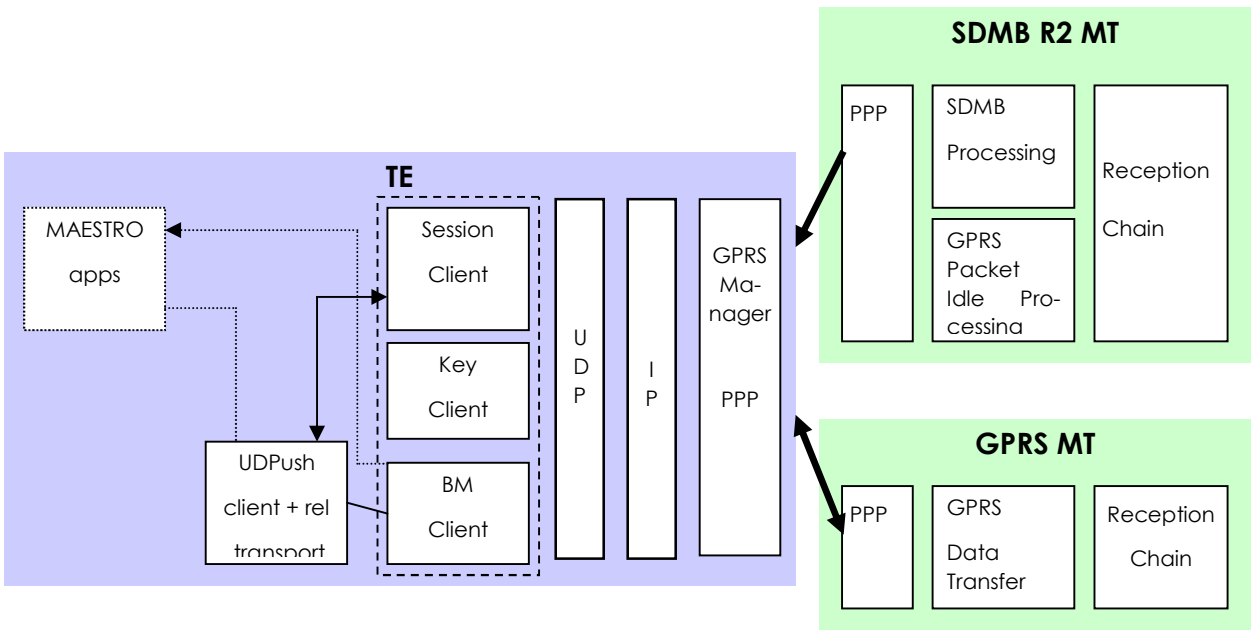

Figure 10 Test Bed R2 UE layer decomposition

The following requirements applicable to the MT are derived from the SDMB system technical requirements for the Test Bed release 2 described in [AD8].

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 transfer
- one mobile terminal for GPRS/UMTS data transfer
- one PC for data post-processing

*

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

The SDMB mobile terminal shall be based out of a 3GPP compliant mobile terminal.

*

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.

*

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

The SDMB receiver shall operate in the following frequency range (GHz): 2.11 <= f <= 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.

*

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

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

*

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

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

*

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

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

*

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

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

*

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

The MAESTRO UE shall be equipped with a test USIM 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.

*

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

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

*

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

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

*

5.3 Test Bed R2 Trial specific requirements (Motorola, UDCast, Logica)

5.3.1 MT – TE interface (Motorola)

In terms of protocol layers, Figure 10 shows that Application and IP stacks are implemented in the Terminal Equipment that is a PC.

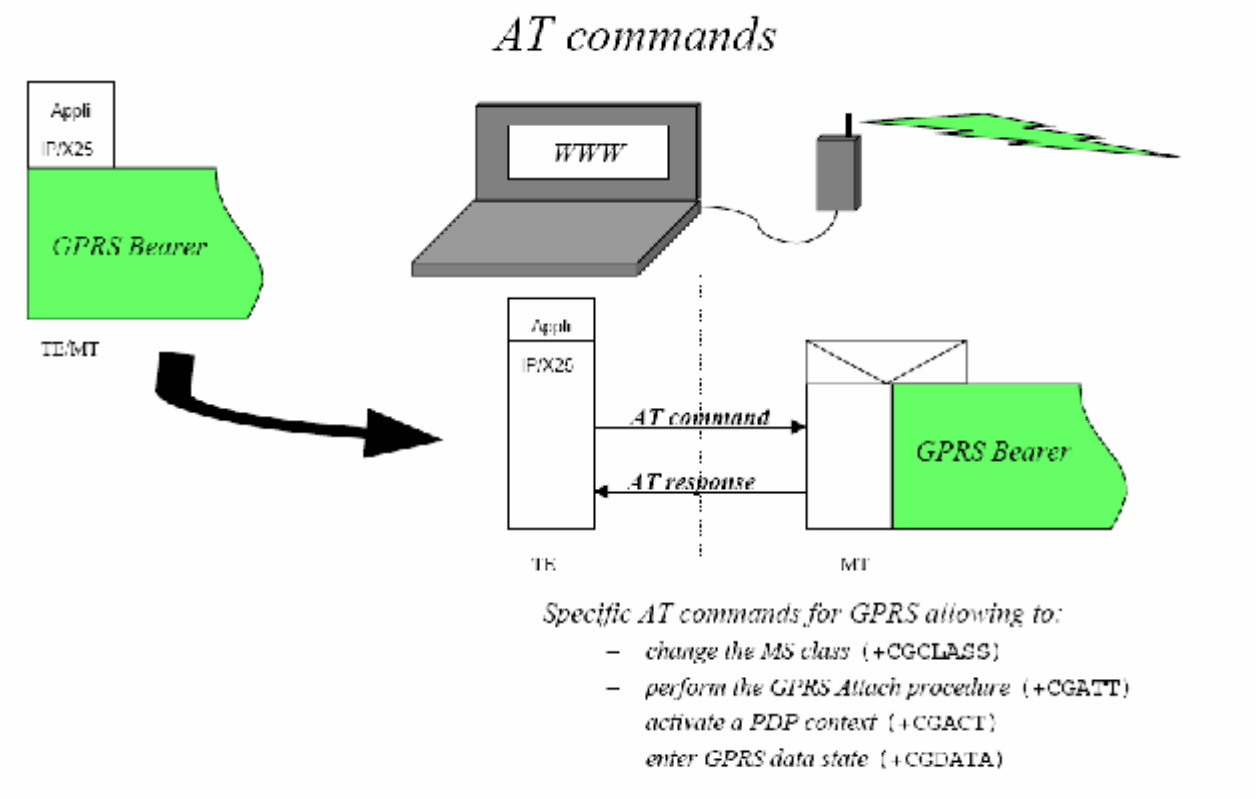

Figure 11 Test Bed R2 MT-TE layer locations

The GPRS attach and PDP activate context procedures are triggered by the TE accordingly to following specifications: GSM 07.60 “AT commands” and GSM 09.61 “Interconnection with external data network”. Therefore the interface between the PC and the Mobile are compliant to the 3GPP specifications. Figure 11 shows AT commands for attach and PDP activate context procedures used in Test Bed release 2.

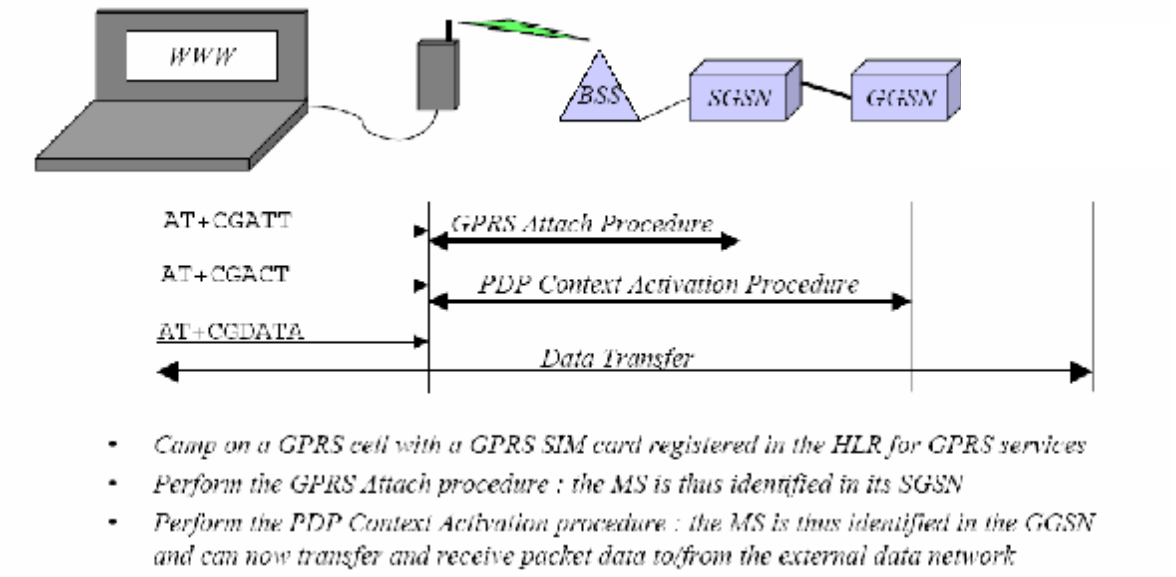

Figure 12 Test Bed R2 MT-TE procedures

6 REFERENCES

6.1 Applicable documents

[AD1] MAESTRO Annex I - “Description of Work”- Technical Annex

[AD2] EU MAESTRO Deliverable D6-1, “SDMB system technical requirements Document (for R1)”, version 3.1, February 2004

[AD3] D06-2-1a.ASP.MAESTRO.v2.1, “SDMB system Design Document for release 1”

[AD4] D06-2-1b.ASP.MAESTRO.v2.1, “MAESTRO Release 1 Test Bed Design Document”

[AD5] D03-1_UNIS_MAESTRO_v2.7, “SDMB Access Layer definition”

[AD6] EU MAESTRO Deliverable D6-3-1, “UE SDMB specification for Release 1”, July 2004

[AD7] D03-1_UNIS_MAESTRO_v2.7, “SDMB Access Layer definition”

[AD8] D06-2-1b - “MAESTRO Release 1 Test Bed Design Document”

[AD9] D06-2-2b - “MAESTRO Release 2 Test Bed Design Document”

[AD10] D06-1-2b – “MAESTRO Release 2 Test Bed Specification Document”

[AD11] D05-2 “MAESTRO Reliable layer requirements”

6.2 Applicable norms and standards

[AN1] TS25.306 v3.7.0, Sect. 5.2.2, UE Radio Access capabilities (Release 1999)

[AN2] 3GPP TS 25.301, “Radio Interface Protocol Architecture”

[AN3] ETSI EN 301192 rel19b, “MPE encapsulation over DVB”