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D10-1.1

S-DMB standardisation report

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Abstract:

The deliverable D10-1 – « S-DMB standardisation report» describes the work done at standardisation level. It consists in Monitoring to follow the evolution of the standards and evaluate the impact or the interesting re-usability on the project. Reports have been done and distributed to permit all the interested partners to have access. The other activity in those standards has consisted in preparing contributions, and participating in the meeting to present these contributions.

Keyword list: standards, 3GPP, ETSI TC SES

EXECUTIVE SUMMARY

This document contains deliverable **D10-1** 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 first of 10.2 tasks in Work Package 10 – "Dissemination". The objectives of this WP are:

- To solve regulatory issues essentially the licensing at 2 GHz: ensure effective access to a given frequency band at the regional scale, as required for S-DMB system, by harmonising licensing procedures.
- In the standardisation area, to have the relevant Standards and Technical Specifications (TS) enabling a satellite component to be integrated and/or compatible in the provisioning and delivery of Multimedia Broadcast/Multicasting Services (MBMS). This implies that activities are undertaken at various levels in 3GPP and ETSI TC SES. Eventually, whenever possible, standard contributions shall propose generic enhancement of both terrestrial and satellite systems based on advanced studies performed in other WPs of MAESTRO.
- To promote the system to ensure standard acceptance, attract additional mobile operators as well as mobile handset manufacturers and interest investors

The deliverable **D10-1** – "S-DMB standardisation report" – describes the work done in the different standardization areas related to the S-DMB system. The first version of this deliverable concerns the past 12 months period of activity.

The task is lead by MSPS and is supported actively by ASP, ASC, UoB as MAESTRO partners.

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1 INTRODUCTION

In the last 12 months period, different activities have been supported in the two main standards bodies found relevant for the MAESTRO project: 3GPP (GERAN and UTRAN) and ETSI TC SES.

The most common one is monitoring. Monitoring has been done to follow the evolution of the standards and evaluate the impact or the re-usability with regards to the S-DMB system. Reports have been done and distributed through WP10 list to permit all the partners to have access. Other WP lists have been added when relevant.

An effort has also been produced in the standards area to prepare contributions, and participate to the meeting to present these contributions. It was done in ETSI standards to update previous set of S-UMTS technical specifications and add standards for MBMS via satellite. A technical report has also been created for the evaluation of OFDM for satellite signals. A paper at 3GPP RAN 4 has also been submitted to evaluate interference issues between satellite and terrestrial signals.

2 3GPP

2.1 GERAN

GERAN standardizes features linked to GSM and its evolution as GPRS (known also as 2.5 G) and EDGE (equivalent to 2.75 G). GERAN, as UTRAN, has identified the need for offering an efficient way to transmit data from single source to multiple destinations over 2/2.5/2.75 G radio networks. The goal is to optimise the resource of the core network and the radio link.

If, for MAESTRO project, the goal is to use the WCDMA radio air interface as for UTRAN, it makes sense to monitor GERAN for different reasons. The first one is to get an idea of the throughput achieved with 2G technologies for MBMS. In fact, MBMS on 2G networks could be seen as a concurrent for SDMB, even if the throughput reached are lower, since the infrastructure is already functional. So this feature could be quickly adopted (less than 2 years).

No modifications are required to the GPRS protocol stack (see 3GPP TS 23.060) for MBMS. However, some of the radio protocols in the GERAN will require modifications to support MBMS p-t-m bearers.

The other reason is, when changing the point of view, to see the SDMB technology as a complement to the existing MBMS on 2G and 3G networks and not as a concurrent. We need to know if the different technologies are coherent (in term of security, identification of the user, how the billing is done…) and then whether to impact the GERAN standards or to re-use the idea of GERAN to apply them to UTRAN or SDMB.

The main difference for MBMS on 2G networks is not on the core network side, since the architecture is almost the same as the UTRAN one, but on the radio link. Then, the monitoring has been concentrated on the radio link. The feature evolves quite slowly since it is not the priority of the majority of GERAN partners. This is due to the current throughputs reached and the needed resource to achieve these throughputs. The following paragraph summarizes the capability for broadcasting of a 2G networks.

In GERAN Release 6, the number of timeslots allocated for the reception of MBMS (*m*) and the number of timeslots allocated for transmission (*n*) shall be such that the sum of *m* and *n* does not exceed 5 (43.246). The limit for the maximum number of received time slots envisaged was 6.

At 12dB C/I, the throughput simulated varies from 2.5 to 10kbps/slot. With a configuration of 4 downlink slots and 1 uplink, the throughput achieved varies from 10 to 40kbps in downlink. The maximum throughput with 6 downlink slots can come up to 60 kbps. The problem is to get 4 timeslots allocated, it requires 60% of BCCH carrier resource and for 6 timeslots, 90% of BCCH resource is needed.

So, the throughput reached compared to the one expected for UTRAN MBMS or SDMB (about 384kbps) seems limited and the carrier resource overloaded to achieve it. It could be sufficient for contents that need low throughput since the deployment of MBMS feature has very low cost impact and could be early adopted.

2.2 UTRAN

UTRAN standardizes within 3GPP 3G features, from core network to radio air interface. SDMB has adopted the same air interface (WCDMA) as 3G networks. One of the goals of the SDMB project is to have as less as possible cost impact on a UE, which is compliant with UTRAN standards. This implies that the UE must have poor hardware and software changes to be able to receive contents with SDMB system. So we try to re-use as much as possible the existing protocols and air interfaces defined in UTRAN.

For broadcasting contents, UTRAN, as GERAN, has identified the need for offering an efficient way to transmit data from single source to multiple destinations over 3 G radio networks in Release 6. Therefore the MBMS feature has been created. SDMB system should re-use the same physical/transport/logical channels as the one used for MBMS. The protocols should also be the same. The main difference is that in SDMB system we should minimize as much as possible the uplink transfer (mainly for power saving reason) when broadcasting. So all the procedure in UTRAN MBMS, which need uplink, should be modified for SDMB (attachment, counting, security procedures…) or done through a terrestrial network. The problem of using an existing terrestrial network to perform those procedures is the payment to the owner of the network to use it, and the potential need to standardize new procedures if they do not exist (if for example we use the 3G network, the standardization of new procedures specific to satellite broadcast could take time to get the agreement of all the 3GPP partners).

Stage 1 (definition of requirements) for MBMS feature has started mid 2001. Since then, stage 2 has been completed and the feature has begun to be defined in the different working groups (Core Network, RAN1 for physical layer, RAN2 for MAC/RLC/RRC layers…). In the last 12 months, the release 6 of MBMS at UTRAN has evolved and is almost frozen. It is a temporary version of MBMS and some subject has to be refined (re-transmission procedure, ciphering, technique to improve performance…) in release 7.

So there was a need to monitor the MBMS standards within WP10, to understand in details this feature and to follow its evolution. As other topic (HSDPA, OFDM) within UTRAN, there was a need to define who was in charge of monitoring each area (RAN1, RAN2, RAN3…) since the knowledge and the ability to follow the specifications was different among MAESTRO partners. The document “standard coverage and responsibilities” posted in MAESTRO website (into WP10 folder), resume the activity of each partner within each area of standardization.

2.2.1 MBMS

MBMS feature specified in RAN1 (TR 25.803) and RAN2 Release 6 has been monitored by MSPS. Through the last 12 months, monitoring has been done and summaries provided to WP10 list. The last 2 summaries have been loaded under WP10 folder in MAESTRO website so anyone from consortium can have access and an historic is possible since each summary includes the modifications from the last RAN meeting. No papers from MSPS have been proposed through the consortium for Release 6. We will try to do it for Release 7, which will be specified in 2005.

Since the summaries resulting from monitoring give the delta view between RAN1 and RAN2 meetings, there was a need to write a document to give a snapshot of the MBMS feature. This has been done by MSPS in the deliverable D09-1a, "Pilot report on emerging 3G features for S-DMB". In this document one chapter is dedicated to monitor different broadcast delivery wireless technologies in order to re-use new concept for S-DMB and main part comes from MBMS. So it was decided that MSPS describes in this chapter the MBMS feature for RAN 1 and 2 as defined in UTRAN Release 6 (which is almost frozen). With regards to what is done in D9-1a, the following paragraphs just give an overview of RAN1 and RAN2 MBMS and focuses on the evolution during the last 12 months.

2.2.1.1 RAN1

RAN1 specifies the physical layer of the radio air interface between the UE and the NodeB. It includes the specification of the physical channel structures, the mapping of transport channels to physical channels, spreading, modulation, physical layer multiplexing, channel coding, error detection and the measurements provided to upper layers.

The physical channel chosen to carry the broadcasted content is the Secondary Common Control Physical CHannel. This Physical channel carries 2 different common transport channels (specified in RAN 2): the FACH and the PCH. The spreading factor for the S-CCPCH can vary from 4 to 256 so a large value of throughput can be handled. This physical channel does not contain power control information which is not a problem for broadcasting content since the transmit power at the NodeB is not adapted to a particular UE but is set to guaranty a certain quality of service to all the UEs receiving the broadcasted content in the cell.

The aim of the technical report 25.803, which contains all the specifications regarding the physical layer for MBMS, is to evaluate the performance of this physical link in the case of broadcasting. The targeted quality of service for MBMS in the physical layer is in general 1 % of BLER. The goal is to get with a certain transmit power value the maximum coverage in the cell with 1 % of BLER on the UE side. Different techniques have been studied in the last 12 months: the TTI size, open loop transmit diversity and combining.

Open loop transmit diversity consists on coding the information to be sent by two antennas.

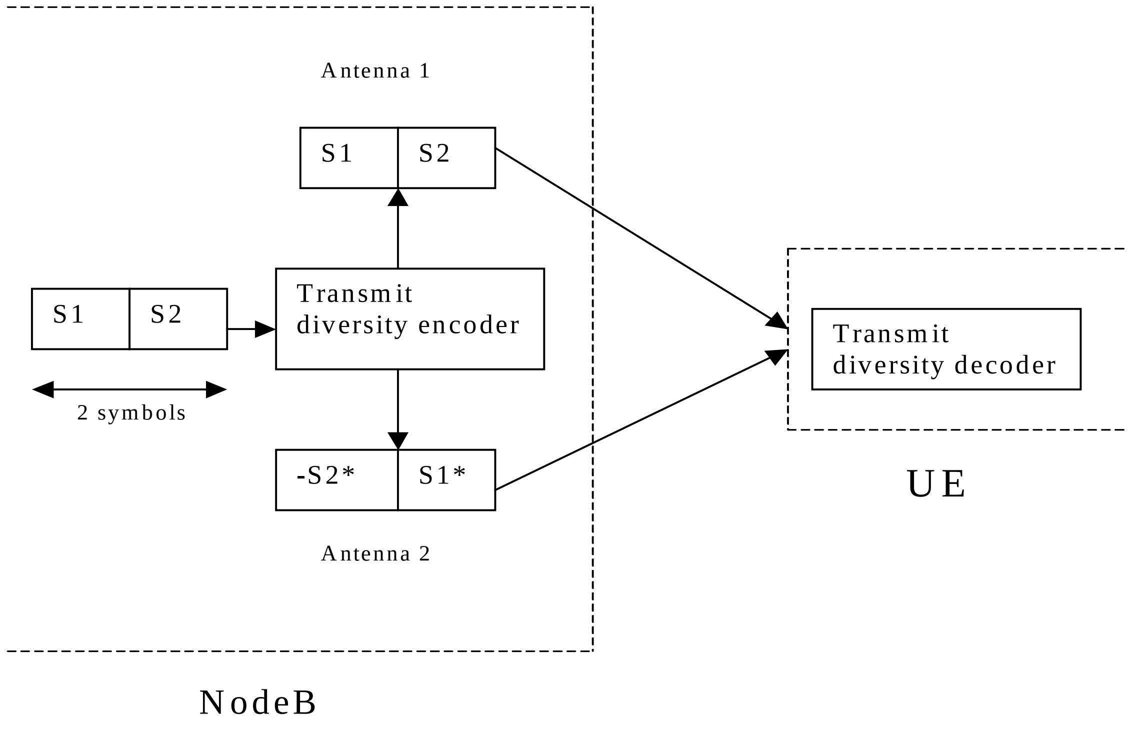

Figure 1: Open loop transmit diversity

In the TR 25.803, results of simulations done with different channel models show the improvement of the performance of the radio link with the open loop transmit diversity. But at now, this technique does not look very interesting in the SDMB technology since it requires 2 antennas at the emitter.

The two others techniques studied are more interesting for SDMB project.

The Transmission Time Interval indicates how often the data is transferred from transport channels to physical channels. TTI possible values are 10,20,40,80 ms. When sending data, a first interleaving is done after channel encoding. The interleaving depth corresponds to the TTI value. In general, the more the TTI value is high, the interleaving depth is wide and then the signal is more robust with regards to channel impairments.

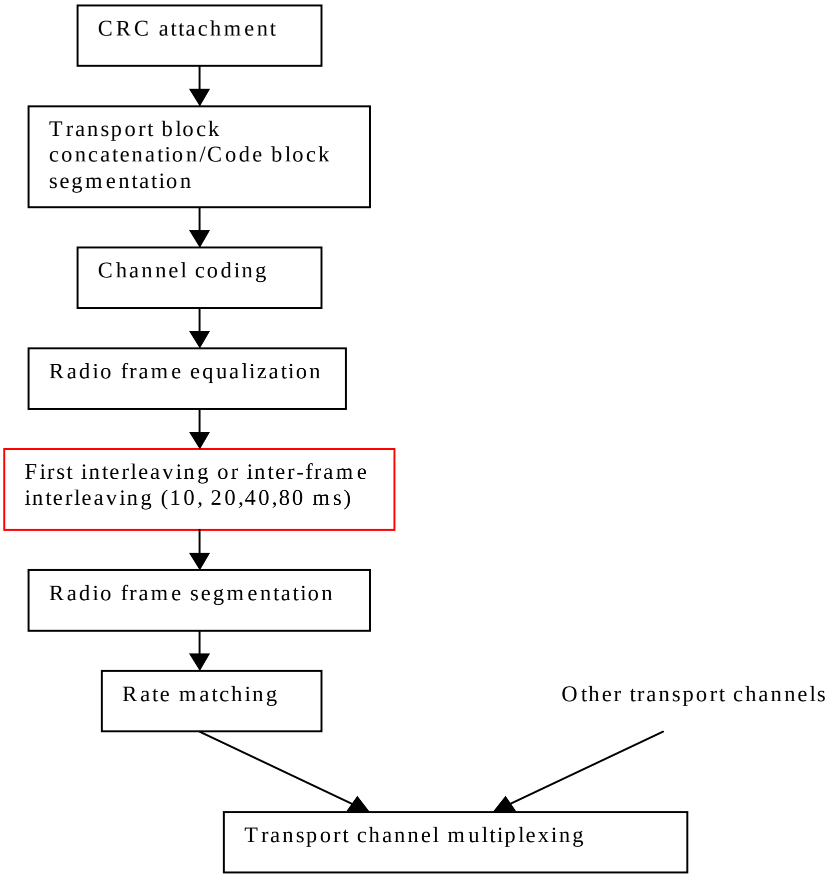

Figure 2: Encoding chain

The simulations in TR 25.803 confirm that the higher the TTI value is, the more performing is the radio link. The problem is that a wide interleaving requires more memory on the UE side to de-interleave the received signal. The main contributions in the last 12 months concerning this topic were studies on the necessary memory to handle high values for TTI. Buffer requirements and needed Release-99 UE capability class for Selective Combining over different numbers of radio links and TTI lengths for a 64 kbps MBMS have been summarized in the following table (which is also presented in D9-1a). For those studies, it has been assumed that the size of the maximum number of bits before de-rate-matching for MTCH MBMS should be defined from physical channel capability and not be based on 6.6 times rule in TS25.306. it was agreed that the MBMS UE capability is defined as a set of combinations of (Bit rate, Number of radio links, TTI length) expressed in terms of memory (buffer) requirement similar to the definition of HS-DSCH capability.

Table 1: **UE capabilities**

-	channel	SF	TTI	No. of S-CCPCH	frame buffer size	TTI buffer size	Total de-coded data size per TTI	Minimum UE class
R99 S-CCPCH	PCH, 24 kbps	128	10	1	600	600	240	32 kbps
MBMS RLs=1	MTCH 64 kbps, 1 RL	32	20	2	3000	5400	1584	128 kbps
			40	2	3000	10200	2928	128 kbps
			80	2	3000	19800	5616	384 kbps
MBMS RLs=2	2 RLs	32	20	3	5400	10200	2928	384 kbps
			40	3	5400	19800	5616	384 kbps
			80	3	5400	39000	10992	2048 kbps
MBMS RLs=3	3 RLs	32	20	4	7800	15000	4272	384 kbps
			40	4	7800	29400	8304	768 kbps
			80	4	7800	58200	16368	2048 kbps

Selective combining has driven a lot of proposal through several companies since it improves the performance of the radio link. In RAN1, only simulation performance where shown with different number of radio links (up to 3). A closed monitoring has been done on this subject and results in a chapter in D9-1a dedicated to this technique. So to get details on that, D9-1a contains all the necessary in formation. What can be outlined is that selective combining has been selected as mandatory for MBMS Release 6. Soft combining, which shows better performance than selective combining could be mandatory for MBMS Release7. Papers presented at UTRAN showed that the memory necessary to perform soft combining was the same as for selective combining, that’s why this technique showed great interest.

No new requirement due to MBMS on rake receiver performance has been noted. This is important for SDMB since the constraints of the satellite combined with repeaters on the propagation channel are different than the terrestrial ones. No input on more finger channel in the rake receiver has been noted which could have been useful for SDMB. Therefore Alcatel Space simulations showed that 12 fingers were needed to get correct performance. It is generally assumed among 3GPP participants that 8 is the maximum number of fingers (it corresponds to the maximum number of rays in the terrestrial channel propagation models). It has to be pointed out that generally the rake receiver processing in the UE are done with hardware accelerator to accelerate the time of treatment. So adding a new branch requires hardware modifications.

No new requirement concerning the size of the rake receiver window has also been noted.

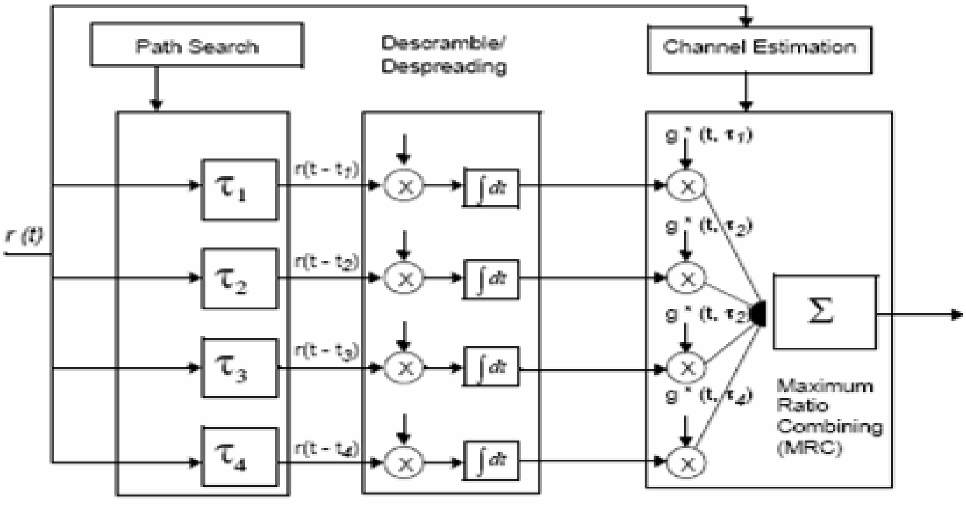

Figure 3: Functional scheme of a Rake Receiver with 4 recombining fingers

+/- 148 chips is the generally implemented size of the window for recombining the received signal at different time instant. When the ray with the maximum amplitude has been found, due to the terrestrial propagation channel models, the search for the other rays is done at plus or minus 148 chips as written above. So in the worst case (the first ray has the maximum amplitude), the length of the recombining window is 148 chips, which could be insufficient for satellite propagation channel model with repeaters.

Agreement has been reached among RAN1 participants not to introduce outer coding (Reed-Solomon based) on radio layer (it is done on application layer/SA4).

An Interesting document on L1 channel coding to cover for measurement losses from Motorola has been proposed for discussion at TSG RAN 1 in January. It evaluates the impact of Inter Frequency and Inter RAT measurements on MBMS. The conclusion is that “ performance degradation can be negligible when the measurements duration is short (3 slots) even for small TTI sizes”.

No layer 1 request based UTRAN quick repair appears in Release 6. It should be added in next Release. On this subject, a document from Philips (R2-040542) on RACH-based feedback signalling for MBMS retransmissions for missing packets has been reviewed. A few small modifications to the RACH procedure for MBMS has been proposed in this paper to avoid uplink signalling interference and inefficient use of resources in the RAN.

2.2.1.2 RAN2

RAN2 specifies the MAC, RLC, RRC, RRM and PDCP protocols.

During the summer, different techniques for the notification of the UE have been presented. Motorola has proposed the 12 bits solution. The idea was to use the 12 “unused bits” at the end of the PICH for broadcast service indicators. This solution has been removed. MBMS notification utilizes a new MBMS specific PICH called MBMS Notification Indicator Channel (MICH) in cell.

Various Secondary Notification Indicator (“SNI”) approaches have been discussed. In the in-band notification approach, additional information is included in the MTCH (through the MAC header or the TFCI) to signal to the UE that there is an upcoming transmission on the MCCH.

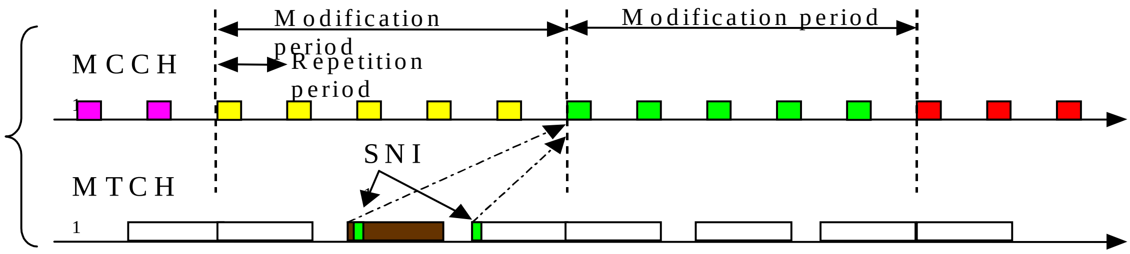

Figure 4: An illustration of MAC header based indication

The schemes allow UEs to receive the physical channels carrying MBMS traffic of interest to the UE, and do not require the reception of additional MICH or additional MCCH. Compared to out-of-band indications, such an arrangement can therefore decrease the power consumption by the UE (e.g. by DRX when MBMS traffic of interest is not scheduled), as well as reduce required UE receiver resources. Out of band indications may also have greater delays, depending on how MICH is scheduled. Finally, in-band indications can also avoid the need to transmit additional overhead such as service ID (since the service ID of the MTCH being received is already known) to support service specific indications of MCCH new data. The drawback of the in-band approach compared to the out of band is the need to read the MTCH to get the SNI even if DRX is used for this MTCH. No agreement has been reached for the in-band notification approach.

To optimise the radio performance, for MBMS, the point-to-point (PTP) or point-to-multipoint (PTM) radio bearer selection procedure is performed before the radio bearer setup. The selection is purely based on the number of users in the cell which is obtained by the counting method. This may result in RACH congestion if number of UEs is high in a cell. To avoid this congestion papers presented at UTRAN proposed to use a probability factor. This technique has been adopted and included in the TS 25.346. It consists of sending a probability factor to the UEs so that that only a fraction of them (corresponding to the probability factor) send a RRC connection request. The NodeB, with the probability factor and the number of RRC connection request can derive the number of UEs. The problem is to get a probability factor that allows getting a sufficient number of UEs answers and also not too much UEs answers to avoid loading the network. For that, a step-by-step technique is being adopted to send the adapted probability factor.

The following sequence chart is extracted from the TS 25.346

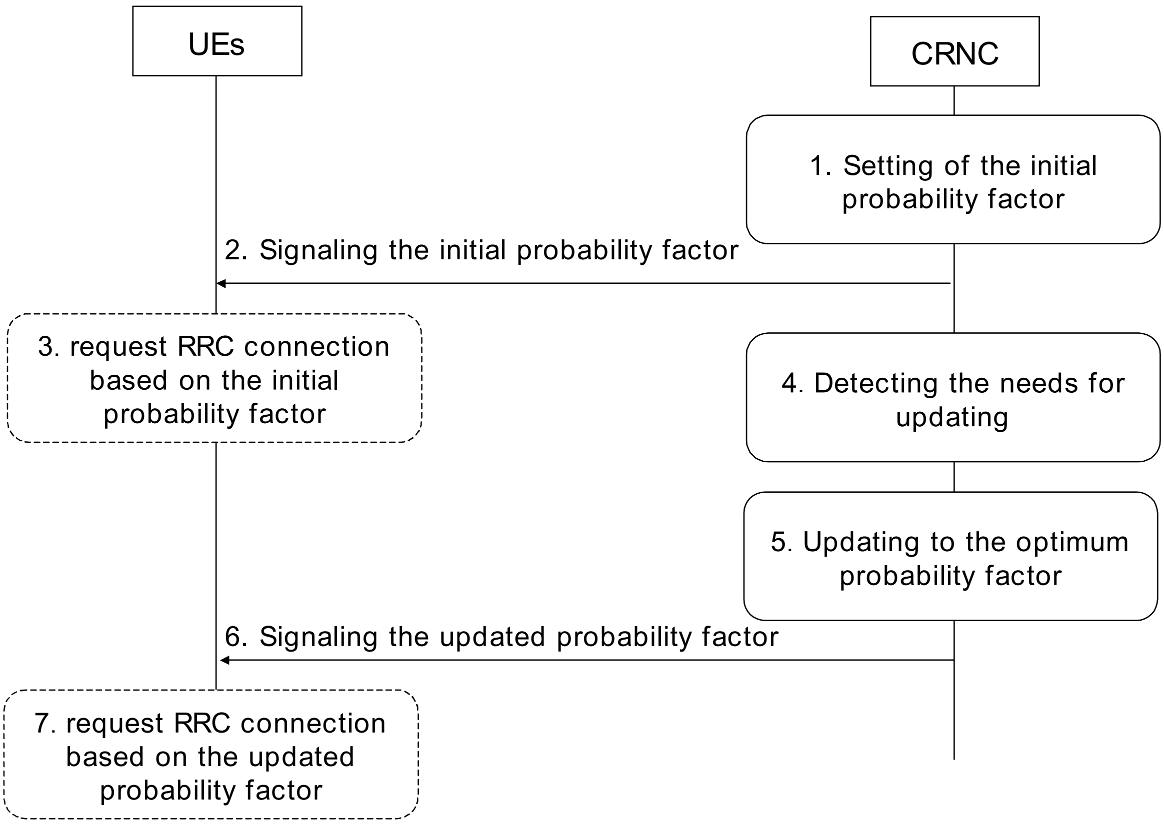

Figure 5: MBMS Access Control Procedure

As mentioned in RAN1 relative section, selective combining is mandatory for Release 6. This decision also introduces a number of issues related to service multiplexing. When selective combining is available between cells the network should send information containing the MTCH configuration of the neighbouring cells, available for selective combining. With this information, the UE is able to receive MTCH transmission from neighbouring cell without reception of the MCCH of that cell.

2.2.1.3 SA3 (security aspects)

The initial principle for SDMB security is to rely as much as possible onto the 3GPP security framework related to MBMS.

The MBMS security subject has been evolving a lot until now (and is still not frozen). Nevertheless, current status offers a good applicability for a SDMB context.

Some attention has been put onto the fact that the studied role models attached to SDMB system encompass situations where the broadcast/multicast datacenter (BM-SC) does not belong to one mobile operator but a SDMB operator complementing mobile system of several mobile networks.

The MBMS security scheme is then to be extended using:

- a particular use of the Generic Bootstrap Architecture
- a secured Gmb interface

2.2.1.3.1 Generic Bootstrap Architecture

The Generic Bootstrap Architecture is used to agree keys that are needed to UE authentication by the BM-SC. In the proposed extension, the BM-SC datacenter is external to the mobile network system. Nevertheless, the schema used in mobility contexts (a UE using a BM-SC located in a visited network) applies: the external BM-SC, acting as a Network Application Function (NAF), shall use a diameter proxy of the NAFs network to communicate with subscriber’s Bootstrapping Server Function (BSF) (i.e. the home BSF).

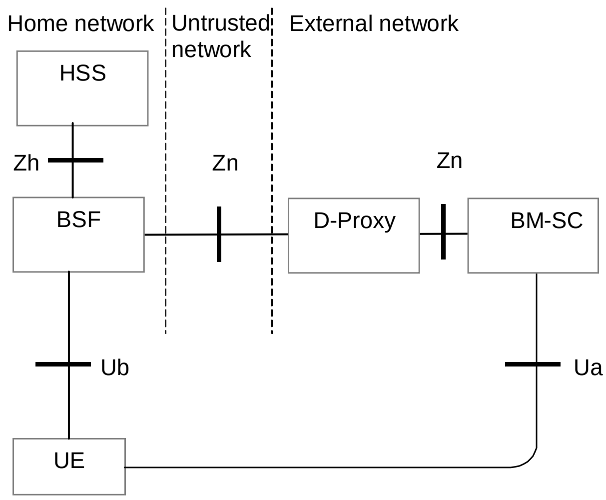

Figure 6: Generic Bootstrap Architecture use

2.2.1.3.2 Secured Gmb interface

The Gmb reference point handles BM-SC related signalling. Depending on the level of control requested by the mobile operator, signalling functions run through the use of the Gmb reference point could be proxied to the third party entity handling BM-SC or processed locally by operators. If some GMB functions are to be supported by the external BM-SC, the communication between the Gmb proxy and the external BM-SCs shall be secured. Mutual authentication, confidentiality and integrity shall be provided.

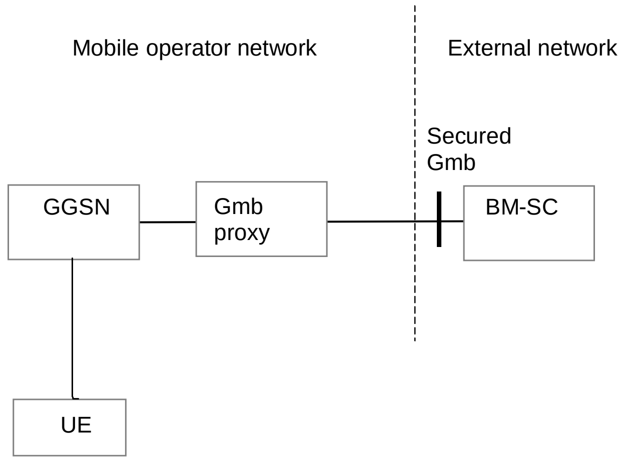

Figure 7: Secured Gmb interface

2.2.1.4 SA4 (codecs)

WP10 has carefully monitored the recent activities carried out within 3GPP TSG-SA4 on the evaluation of different packet coding techniques for MBMS streaming and download services. A large amount of documentation has been produced during several ad-hoc meetings held around the world in the last two years. WP10 has collected most of these documents, has analysed them, and has gathered the principal results in a technical note (TN09-3-01_UOB_MAESTRO_V1_0). This technical note was mainly based on the subsequent 3GPP documents:

- 3GPP TSG-SA4#30 Tdoc S4-040080;
- 3GPP TSG-SA4#31 Tdoc S4-040348;
- 3GPP TSG-SA4#32 S4-040489;
- 3GPP TSG-SA4#32 Tdoc S4-040449;
- 3GPP TSG-SA4#32 Tdoc S4-040465;
- 3GPP TSG-SA4#32 Tdoc S4-040471;
- 3GPP TSG-SA4#32 Tdoc S4-040549;

- TSG System Aspects WG#4 S4-AHP120.

The major outcomes of the 3GPP activities gathered in the technical note are

- the description of the MBMS scenario where transport layer FEC codes could be envisaged;
- the definition of the requirements of FEC architectures for MBMS services;
- the definition of the requirements and characteristics of the Streaming services in terms of delay constrains and data unit sizes;
- the definition of the requirements and characteristics of the Download services in terms of loss tolerance, delay constraints and data unit sizes;
- the definition of the guidelines for simulation procedures to compare different FEC techniques;
- the recommendation that any comparison of different packet FEC techniques is conducted following the suggested simulation procedure guidelines and that performance is evaluated in terms of probability of unsuccessful decoding of the entire file (for downloading) and average post decoding SDU losses (for streaming), considering several transmission quality scenarios and different overhead values (redundancy plus FEC headers).

To date, a final selection of the FEC scheme (or schemes) to be adopted for MBMS streaming and download services is not yet completed; however, it is un-disputable that three different FEC schemes are preferred, namely

- the1D/2D Reed Solomon codes (proposed by Nokia, Siemens, Ericsson, and Bamboo);
- the class of LDPC code called “Copper codes” (proposed by NEC);
- the class of rateless LDPC codes called “Raptor codes” (proposed by Digital Fountain).

On the basis of this monitoring activity, which is going to be continued during the second project year, technical activities have been started within WP05 and WP09 to evaluate the first two schemes in the S-DMB scenario.

2.2.2 HSDPA

A monitoring has been done by MSPS concerning HSDPA in RAN1, RAN2 and RAN4. Two summaries (for March and April) have been posted to WP9/WP10 mailing lists. Continuing this monitoring by Motorola of HSDPA seems to have poor interest since studies for WP9 will rely on Release 5, which is almost com-pleted. So this monitoring has been stopped.

2.2.3 OFDM

The monitoring activity of the 3GPP RAN1 group, carried out within workpackage 10 during the first months of the project, highlighted that the feasibility of an OFDM-based physical layer for the downlink of the HSDPA system was under study [25.892]. The 3GPP study item was concluded in June 2004, showing that the OFDM-based physical layer could produce many advantages, in particular in terms of spectrum efficiency.

3 ETSI TC SES

ETSI SES/S-UMTS working group role is to standardise Satellite UMTS radio interface.

A first set of Technical Specifications was produced in December 2000, based on ITU Satellite A-family radio interface, i.e. SW-CDMA.

Since this date, various studies showed the necessity to update S-UMTS Technical Specifications in order to align to 3GPP UTRA FDD W-CDMA radio interface, the main objective being to allow operation of low cost User Equipment in satellite systems.

The results of these studies can be found in three Technical Reports:

- ETSI TR 102 058: Satellite Earth Stations and Systems (SES); Satellite Component of UMTS/IMT-2000; Evaluation of the W-CDMA UTRA FDD as a Satellite Radio Interface.
- ETSI TR 102 277: Satellite Earth Stations and Systems (SES); Satellite Component of UMTS/IMT-2000; Satellite Component for Multimedia Broadcast/Multicast Service (MBMS); W-CDMA Radio Interface.
- ETSI TR 102 061: Satellite Earth Stations and Systems (SES); Satellite Component of UMTS/IMT-2000; Detailed analysis of the packet mode for the SW-CDMA (Family A).

ETSI SES/S-UMTS now enters in a phase of updating previous set of S-UMTS Technical Specifications and creating standards for Multimedia Broadcast/Multicast Services (MBMS) via satellite. Additionally, OFDM is being evaluated for enhancement of satellite UMTS.

The list of Technical Specifications now being updated/created for the definition of the radio interface is:

ETSI TS 101 851-1 (update)	Satellite Earth Stations and Systems (SES); A-family; Part 1 : Physical channels and mapping of transport channels into physical channels (S-UMTS-A 25.211)
ETSI TS 101 851-2 (update)	Satellite Earth Stations and Systems (SES); A-family; Part 2 : Multiplexing and channel coding (S-UMTS-A 25.212)
ETSI TS 101 851-3 (update)	Satellite Earth Stations and Systems (SES); A-family; Part 3 : Spreading and modulation (S-UMTS-A 25.213)
ETSI TS 101 851-4 (update)	Satellite Earth Stations and Systems (SES); A-family; Part 4 : Physical layer procedures (S-UMTS-A 25.214)
ETSI TS 101 851-5 (created)	Satellite Earth Stations and Systems (SES); A-family; Part 5 : UE Radio Transmission and Reception (S-UMTS-A 25.101)

The list of Technical Specifications created for introduction of satellite MBMS is:

ETSI TS xxx xxx	Satellite Earth Stations and Systems (SES); Satellite Component of

	IMTS/IMT-2000; Multimedia Broadcast/Multicast Services (MBMS) Services
ETSI TS xxx xxx	Satellite Earth Stations and Systems (SES); Satellite Component of IMTS/IMT-2000; Multimedia Broadcast/Multicast Services (MBMS) Architecture and functional description
ETSI TS xxx xxx	Satellite Earth Stations and Systems (SES); Satellite Component of IMTS/IMT-2000; Multimedia Broadcast/Multicast Services (MBMS) Introduction in the Radio Access Network (RAN)
ETSI TS xxx xxx	Satellite Earth Stations and Systems (SES); Satellite Component of IMTS/IMT-2000; Multimedia Broadcast/Multicast Services (MBMS) Security
ETSI TS xxx xxx	Satellite Earth Stations and Systems (SES); Satellite Component of IMTS/IMT-2000; Multimedia Broadcast/Multicast Services (MBMS) Inter-working with Terrestrial UMTS networks
ETSI TS xxx xxx	Satellite Earth Stations and Systems (SES); Satellite Component of IMTS/IMT-2000; Multimedia Broadcast/Multicast Services (MBMS) Performances over the Radio Interface

The MAESTRO project deemed it useful to repeat a study similar to that carried out by 3GPP RAN 1 on OFDM feasibility with reference to the S-DMB scenario and to input the results of such study to the ETSI TC SES S-UMTS working group, through WP10. In June 2004, the new work item "Satellite Component of UMTS/IMT-2000; Feasibility Study for OFDM for S-UMTS enhancement "(DTR/SES-00252) was therefore opened during the TC SES S-UMTS group meeting # 22 to evaluate the feasibility of the OFDM-based physical layer proposed in the 3GPP study item for the FL of the S-DMB system. Although contributions from other sources are welcome for the future, to date the major support to this WI has come from the activity of the MAESTRO projects workpackage 9, provided to ETSI through the WP10 actions.

The ETSI WI objectives are:

- to evaluate the possible advantages introduced by the OFDM-based physical layer in the S-DMB downlink scenario;
- to evaluate the feasibility of this physical layer;
- to be ready to contribute to possible standardization actions within 3GPP related to the OFDM physical layer;
- to recommend possible adaptations of the 3GPP OFDM physical layer to make it suitable also for an efficient use through a non-linear satellite link
- to limit the modifications of the standard to the physical layer level.

To date, MAESTRO has produced the table of contents of the technical report associated to the WI. The table of contents has been adopted during the ETSI TC SES S-UMTS meeting #23. In the upcoming meeting #24, to be held on January 19 and 20, 2005, the first results produced within WP09 will be presented and an update of the TR will be proposed.

In parallel to these activities, ETSI SES/S-UMTS contacted 3GPP RAN4 for establishing co-operation for frequency coexistence issues. RAN will review simulations from ETSI and will assess them.

4 REFERENCES

- **TS 22.146**: TSG Service and System aspects; Multimedia Broadcast/Multicast Service; stage 1 (SA1)

- **TS 22.246** ”Requirements for MBMS” (SA1)

- **TS 23.246**:TSG Service and System aspects; Multimedia Broadcast/Multicast Service; Architecture and functional description

- **TS 25.346**: TSG Radio Access Network; introduction of the MBMS in the Radio Access Network; stage 2 (RAN2)

- **TR 25.803** S-CCPCH performance for MBMS (RAN1)

- **TR 25.992**: TSG Radio Access Network; MBMS; UTRAN/GERAN requirements; (RAN)

- **TR 25.892**: Feasibility study for OFDM for UTRAN enhancement.

- **TS 33.246**:TSG Service and System aspects; 3G Security; Security of Multimedia Broadcast/Multicast Service (SA3)

- **TS 33.220**: TSG Services and System Aspects; Generic Authentication Architecture (GAA); Generic bootstrapping architecture

- S-DMB Role Model: IST Integrated Project No 507023 – MAESTRO ; D1-1

- Standards coverage and responsibilities: MAESTRO WP10 document

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