3GPP1 TSG (Common meeting) **Tdoc TSG#1(98)032**

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Doc For	TSG SA	TSG CN	TSG RAN	TSG T
Decision				
Discussion				
Information	**X**	**X**	**X**	**X**

Source: Program Manager/Secretary SMG11

Title: SMG11 concepts on UMTS

1 Introduction

UMTS speech codec standard has been debated (since 1997) in SMG11 in view of the basic speech service that should be standardised for UMTS.

The general discussion took place in SMG11 on speech coding in terms of quality (reference GSM) and spectrum efficiency. Main points raised regarded implementations aspects (floating point vs. fixed point solutions).

Wide band services for UMTS, considering the interactions of speech/channel/bearer services need well defined requirements/priorities of different types of speech services for a “generic bearer capability”.

Some of the most important aspects of speech services that should be taken into account and supported by UMTS bearer services are: delay, quality, activity/inactivity of speech, bit-rate, variable rate, trade-off quality/capacity and multi-mode operation, protection of coded bits. In the design of UMTS default speech service, a fall-back solution could be one of the existing standards (Full Rate, or better Enhanced Full Rate, in the short term, and Adaptive Multi Rate, known as AMR, when available).

The need for “Unequal Error Protection” for coding algorithms was raised several times, considering from one side the interactions between radio channel and speech, and, on the other side, that in UMTS a different air interface (UTRA) from GSM may support TDMA / CDMA, and different modulation schemes. The preferred approach and one which is consistent with the UTRA design principles was that the access system should define and be responsible for providing a range of bearers including those for the support of speech. These bearers should guarantee certain levels of (unequal error) protection. The access system itself (rather than the speech system as with AMR) would then be responsible for the adaptive techniques and channel protection to provide these generic “speech bearers”.

During the debate, more than one organisation stressed the point that the characterisation of bearers in terms of support of speech coding should take into account the need to put bits in different classes, and such capability of bearers should be guaranteed.

At least one organisation pointed out that, in future, a generic access (i.e. channel codec in the network instead than in the Base Station) could become a reality; therefore, the approach for UMTS should be flexible enough.

In conclusion, it was remarked that SMG11 should put requirements to support aspects like adaptive type of codecs / unequal level of protection of bits, that may interact with the choice of the UTRA air interface, and the way how bearers do support streams of speech/data.

Variable bit-rate speech coding in UMTS would request continuous transmission of speech, that will represent a substantial portion of UMTS traffic for a (long) while. Due to the limited radio spectrum

allocated to UMTS, another efficient and flexible key technology for speech transmission is Variable Bit Rate (VBR) speech coding, that presents a number of benefits, as well as the implications for the UTRA (mainly unequal error protection, UEP). From a VBR perspective, UTRA should also provide low delay bearers supporting multiple bit rates, which can be varied on a frame by frame basis.

Different opinions were expressed during the discussion of this issue, and it was requested to distinguish VBR from high quality Discontinuous Transmission -DTX- (to be supported), as VBR source coding in error conditions may reveal difficulties in terms of quality/capacity advantages.

Focusing on the air interface, it was agreed (provisionally) that

- high quality DTX (frame by frame) should be supported
- the radio access system should provide bearers with Unequal Error Protection and guaranteed maximum error rates
- switching between bearers will be necessary probably at frame rates.

SMG11 discussed which bearers (bit rates etc.) would be needed, and agreed to provide quantified examples (e.g. regarding UEP, maximum error rates, bearer switching rates).

SMG11 debated as well other aspects concerning speech coding issues related to UMTS (negotiation of speech codec at call set-up to avoid codec mismatching, transcoders allocated in the UMTS network side, that would support TFO).

In conclusion, key issues were addressed (at SMG11) e.g. re-use of existing codecs, constraints imposed by bearer approach, performance targets.

UMTS/GSM Speech coding strategy issues towards UMTS voice codec, either “generic” (e.g. like multi-media MPEG) or “specific” (e.g. GSM), led SMG11 to propose EP SMG to consider the AMR algorithm for evaluation.

2 Codec techniques (channel adaptation, source adaptation, etc.)

In principle the system should support broad services.

It was suggested for the time being to rely on existing solutions, if possible.

3. Development time scales

As far as regards the timescale the deadline of end 1999 was considered for the development of UMTS specifications.