TSG-RAN Working Group1 meeting #7 ***TSGR1#7(99)c30***
Hannover, Germany, Aug.30-Sept.3, 1999

Agenda Item : ad-hoc 4

Source : Nortel Networks

Title : Towards the support of UEP for speech in UTRA

Document for : Decision

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1. Introduction

R1-99c46 showed that usage of Unequal Error Protection (UEP) for speech in UTRA brings some performance improvement compared to usage of Equal Error Protection (EEP). Thus Nortel recommends that tools are provided in UTRA to allow support of speech in Release 99, and encourages joint work with S4 to assess the voice quality in UTRA.

In order to perform some codec characterization, S4 has requested some information on the possible channel coding schemes available in UTRA. In R1-99b85 Nokia proposed to list some parameters available and to add some additional mapping rules due to usage of Blind Rate Detection for speech. However, it is possible to support speech with TFCI, which allows more flexibility in the choice of channel coding scheme. Nortel think that the scheme defined with TFCI should take advantage of the flexibility provided by TFCI usage. Thus the additional mapping rules put by usage of BRD should not be taken into account when TFCI is used, since it would restrain this flexibility. This might lead to the indication to S4 of two cases for choosing channel coding characteristics, one to be used with TFCI where benefit due to the flexibility of TFCI would be used, and one to be used with BRD and for which additional rules should be taken into account.

2. Parameters available to define speech channel coding

The following parameters are available for channel coding and should be indicated to S4.

- convolutional coding (for Release 99 at least),
- code rate ½, 1/3, no coding
- CRC of 0bits, 8bits, 16bits
- Maximum puncturing rate, maximum repetition rate

3. Additional rules due to use of Blind Rate Detection

As stated in R1-99b85, the usage of Blind Rate Detection for speech leads to some the following rules

- Same rate matching pattern for all modes of each class of bits
- Definition of exactly 3 TrChs for speech
- Need for longer CRC

4. Degree of freedom to take advantage of the flexibility due to usage of TFCI

Using TFCI provides a higher degree of flexibility, needed to have a channel coding adapted to each mode of the codec.
The idea is to be able to have different coding scheme for the different modes of each bits class. TrCh parameters as coding rate, rate matching ratio, are static parameters. Thus in order to be able to have different ones for different modes of one class of bits, several TrCHs have to be defined. The number of TrCHs available might potentially be 19 (1 Trch per mode per class, so 2 modes with 3 classes, 6 modes with 2 classes and one DTX mode with one class). Thus no limit of the number of TrChs lower than 19 should be defined for the support of speech.
Also it should not be restricted that the rate matching parameters should be constant for one class of bits. In this case of course it is needed that flexible position are allowed to be used.

5. Conclusions

Nortel recommends to support of UEP for speech for release 99 in UTRA, and to progress in the support of speech in general, in co-operation with S4. In order for S4 to progress on codec characterization work, S4 sent a liaison to WG1 to get information on the support of speech service in L1, so a liaison should be sent to them indicating the tools available in L1.
However these indications should not take into account the mapping rules due to usage of BRD in all cases, since usage of TFCI is possible and allows more flexibility to define channel coding for voice. It should be possible to take advantage of this flexibility. This might lead to two cases for the choice of channel coding schemes for voice, one set not taking into account the additional mapping rules due to usage of BRD, and one taking them into account. This should be indicated to S4.
Regarding the progress of the work on speech, since many Working Groups are likely to need to exchange information to help the characterization work (R4 for the simulator, R1 for the channel coding issues…), Nortel thinks that a way to speed up the discussions would be to create a common ad hoc, which could work via emails.
A draft liaison to answer the S4 liaison received in WG1#6 is presented in document R1-99a59.