TSG-RAN Working Group1 meeting #7 **TSGR1#7(99)d33**
Hannover, Germany, 30th August – 3rd September 1999

Agenda Item: **Ad Hoc 4**

Source: **NTT DoCoMo and Ericsson**

Title: **L1 Transmission Method fit for AMR Speech**

Document for: **Discussion and Decision**

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1. Introduction

The AMR speech codec, which is specified in TSG SA WG4, has eight different speech data rates and three different protection classes for speech data [1]. There are some L1 key parameters to be used for AMR speech transmission, i.e. number of TrCHs, CRC attachment, channel coding and puncturing, rate detection method and DCCH multiplexing method. We DoCoMo done some investigation [2],[3],[4] about the best combination of those key parameters for AMR speech transmission and we also continued further investigations so far. This document describes our proposals of key parameters for AMR speech as our investigation results.

2. Proposed L1 key parameters for AMR speech transmission

2.1 Number of TrCHs

Proposal: **"3 TrCHs per one AMR speech service"**(one TrCH for each class)

- The maximum flexibility for UEP can be obtained.
- L1 CRC can be attached on class-A data (see section 2.2).
- DCCH transmission by class-C stealing could be achieved (see section 2.5).

2.2 CRC attachment

Proposal: **"12-bit L1 CRC [4] is attached for only class-A data"**and **"C odec CRC (Internal CRC) for Class-A is not used "**

- 12-bit CRC could achieve a reasonable false rate detection probability performance in downlink BRD [4] (8-bit CRC on the other hand not be enough).
- L1 CRC for only class-A data could produce enough performance of uplink selective combining.

2.3 Channel coding and puncturing

Proposal: **"Convolutional coding is used for all classes"**and **"F i xed coding rate (1/3 for both class A and B, 1/2 for class C) and common static puncturing factor are used among the different AMR modes within one class "**

2.4 Transport foramt (Rate) detection method

Proposal: **"For UE, blind transport format detection is mandatory in downlink and TFCI is mandatory in uplink"**

- In order to enable downlink blind transport format detection using CRC for class-A, a modification of AMR format is needed for AMR6.7kbps mode i.e. including class-A data with 55-bit [4].

2.5 DCCH transmission method

Proposal: **"Around 2-4 kbps is always reserved for DCCH"** and if necessary, **"additional 3 kbps is achieved by means of class-C stealing"**

- "class-C stealing" is necessary to specify additional L1 multiplexing rule but no control from higher layer is needed.

3. Conclusion

This document describes our proposals of L1 key parameters for AMR speech transmission. Considering load of conformance testing and reliable connectivity among 3G systems, each key parameter should be specified with meaningful flexibility. And R1 should decide these key parameters in this meeting for approval of L1 specifications in TSG-RAN#5.

References

[1] "Mandatory Speech Codec speech processing functions AMR Speech Codec; Frame Structure", TS 26.101
[2] Ericsson, "Simulations of UEP and EEP channel coding for AMR12.2", TSGR1#6(99)887
[3] NTT DoCoMo, "Investigations of AMR speech transmission", TSGR1#6(99)a01
[4] NTT DoCoMo, "Blind rate detection for AMR speech transmission", TSGR1#7(99)c54