Agenda Item	**:**	AMR Mode Command
Source	**:**	Nortel Networks[1]
Title	**:**	Discussion on requirements for transmission of AMR Mode command in UTRA
Document for	**:**	Discussion

1. Introduction

It has been identified that AMR Mode Commands should be transported in L1 for adaptation purposes.

Thus, this document discusses first the characteristics of these AMR Mode Commands and the requirements for their transmission.

Then, assuming that these AMR mode commands are transmitted in a separate Transport Channel, as it has been decided by WG2, the document lists the requirements for the channel coding scheme and the Transmission Time interval for this Transport Channel, in order to clarify these requirements before discussing the actual coding scheme to be used.

2. Characteristics of the AMR Mode Command transmission

- The main characteristic of this AMR Mode Command is that it consists of a very low number of bits to be transmitted in each Transmission Time Interval. Initially it consists of three bits. Further, WG2 has decided to transmit it as the TFCI word indicating the TFC which corresponds to this codec mode and which should be used in uplink. Thus now this AMR Mode Command consists of one to six bits.

- A second characteristic is that the transmission of this AMR Mode Command should be very reliable. First, the signalling of the AMR Codec Mode Commands should be in terms of BER at least as reliable as the transmission of the most reliable speech TrCH among the AMR TFCs. One could also set that this signalling channel should be at least as reliable as the TFCI since its purpose is alike. Second, there is a need for error detection on this Command. With error detection, if it is found that the command received is not reliable enough, it would not be used but some default decision would be taken, for instance staying with the codec mode of the previous frame. This is very important since an unjustified change of codec mode would spoil the voice communication for several frames.

- A third characteristic is that it should be possible to send one AMR Mode Command as often as every 20ms, whether or not some speech is transmitted in the frames in case Voice activity detection is used.

- A fourth characteristic is that the delay with which the AMR Mode Command is to be transmitted from the RNC to the UE should be as short as possible.

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3. Requirements on the channel coding scheme for the Transport Channel of AMR Mode Command

Assuming that the AMR Mode Commands are transmitted in a separate Transport Channel, as it has been decided in WG2, the characteristics of AMR Mode Command Transmission listed previously can be turned into requirements for channel coding scheme to be used on the Transport Channel.

- First, this coding scheme must be able to protect efficiently one to six bits. This means ensure good protection while having a reasonable number of output bits from the channel coding.

  It is anyway in WG1 mission to provide efficient coding scheme for Transport Channels that carry from 1 to 5000 bits. Thus WG1 has to assess whether the currently defined coding scheme are efficient enough for this size of TrCh. If it is felt by WG1 that there is no use to encode such small size TrCh, WG2 should certainly be informed of this through a Liaison, since today they rely on the feasibility to transmit from 1 to 5000 bits in L1.

- Second, as seen before there must be some way to perform error detection on the received encoded word.

4. Requirements on the Transmission Time Interval for the Transport Channel of AMR Mode Command

Since it must be possible to transmit one AMR Mode Command every 20ms, the TTI is necessary 20ms or less. Having a TTI of 10ms does not present so much interest. It would reduce the time diversity if then the AMR Mode Command was transmitted every other 10ms frame. If AMR Mode Command was repeated each 10ms, it would use twice as many bits, while other coding schemes are more efficient than repetition.

5. Conclusion

In this document, the characteristics of AMR Mode commands transmission have been identified. They are low number of bits, high reliability with error detection possibility, high frequency, and low transmission delay.

Then, assuming that AMR Mode Command is transmitted in a separate TrCh, as decided by WG2, the requirements regarding channel coding and Transmission Time Interval for this TrCh were derived. Channel coding should protect efficiently a low number of bits, and error detection should be possible. A TTI of 20ms would be recommended.