

**Agenda Item:**

**Source:** NTT DoCoMo

**Title:** AMR command signalling and command bits transmission

**Document for:** Discussion

**1. Introduction**

NTT DoCoMo proposes one possibility to transport AMR mode command over RAN. There are two kinds of proposals: one proposal for AMR command signalling and the other proposal for AMR command bits transmission.

**2. Proposed AMR command signalling**

In W-CDMA (3G-system), it is assumed that the required AMR mode changes are on a slow basis. This mode change can be achieved by L3 signalling basically. On the other hand, in GSM TFO case, the required AMR mode changes will be on a fast basis. We therefore propose the parallel signalling below.

The proposed signalling scheme is shown in Figure 1 and this introduces,

- Signal W-CDMA desired UL mode on ordinary DCCH (command on a slow basis).
- Signal GSM desired DL mode through in-band command bits (command on a fast basis).
- Do command combining with minimum principle in the UE.

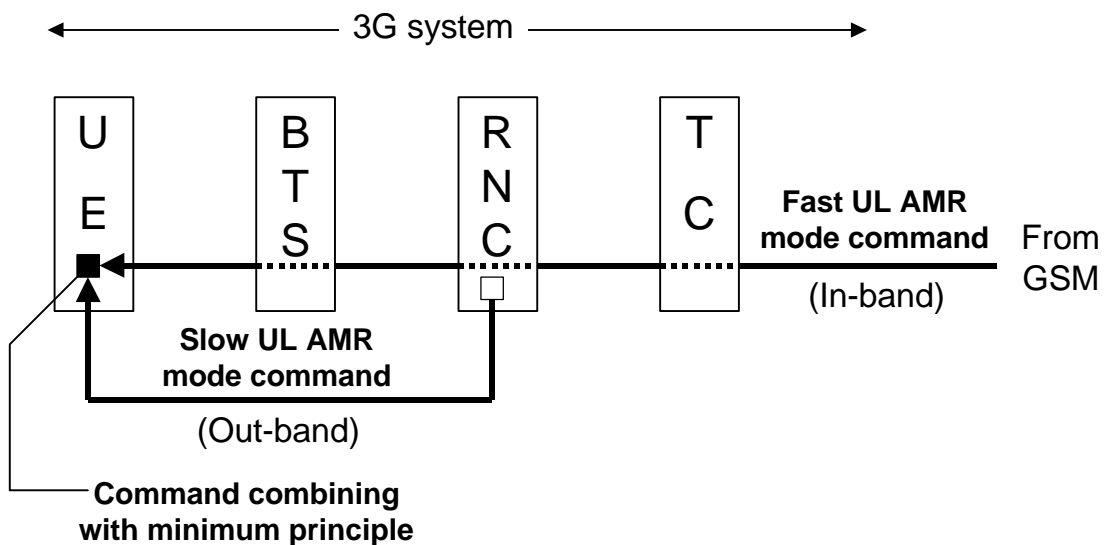


Figure 1. AMR command signalling for GSM TFO case

This scheme can release RNC from AMR command control processing. This scheme also match with the following efficient AMR command bits transmission scheme.

### 3. Proposed AMR command bits transmission

The proposal is that AMR mode command bits are transferred together with Class-A bits. The proposed scheme is shown in Figure 2. In this case, Mode Command bits and Class-A bits are protected by CRC to be attached at layer-1.

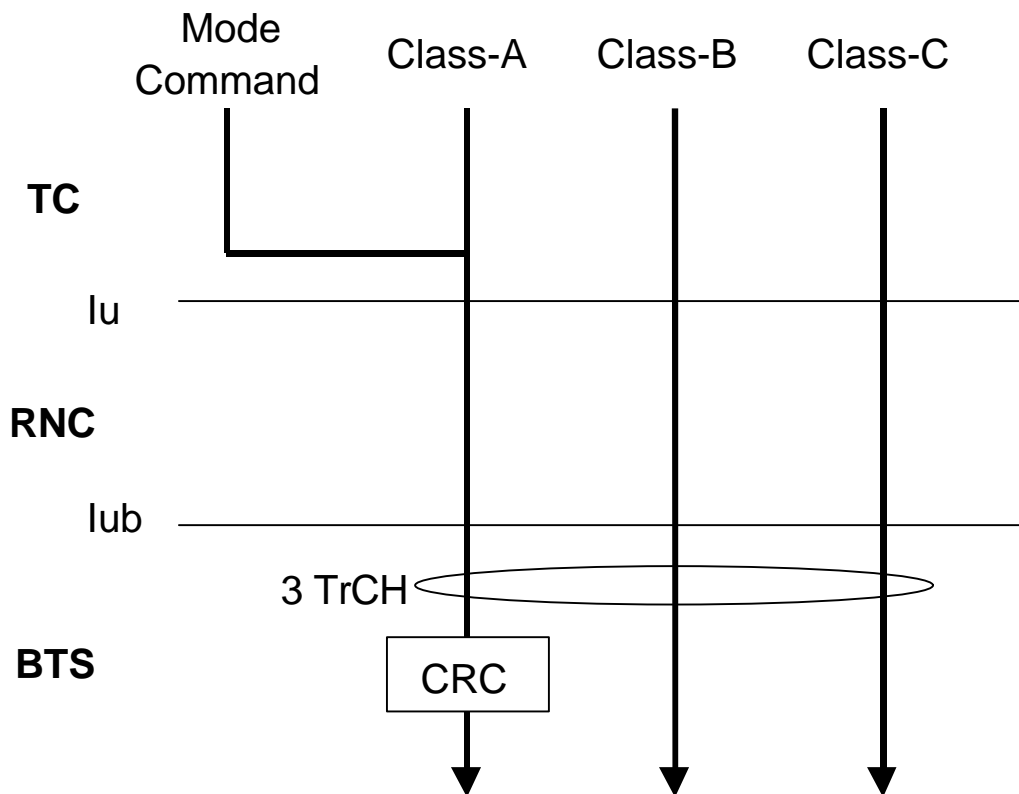


Figure 2. AMR mode command bits transmission

Advantage and disadvantage of this proposal is as follows.

Advantage:

- No impact to RAN specifications.
- No more RAN overhead is introduced.

Disadvantage:

- Impact to Codec specifications. (Small changes will be needed on TS 26.101)
- FER of AMR frame would slightly increased, but this would not cause major degradation on speech quality

Regarding FER increasing, we evaluated actual FER performance by simulation. A simulation result is shown in Figure 3. Here, the following simulation conditions were assumed:

- Physical channel: downlink format and channel bit rate = 64 kbps (SF = 128)
- Channel coding: R=1/3 convolutional code with constraint length of 9
- Channel decoding: soft decision Viterbi decoding
- Interleaving span: 20 ms
- Channel estimation: 2-slot averaging
- Diversity: 2-branch antenna space diversity and 2-finger Rake/branch
- TPC: on
- Channel model: 2-path Rayleigh fading channel with having equal average power per each path

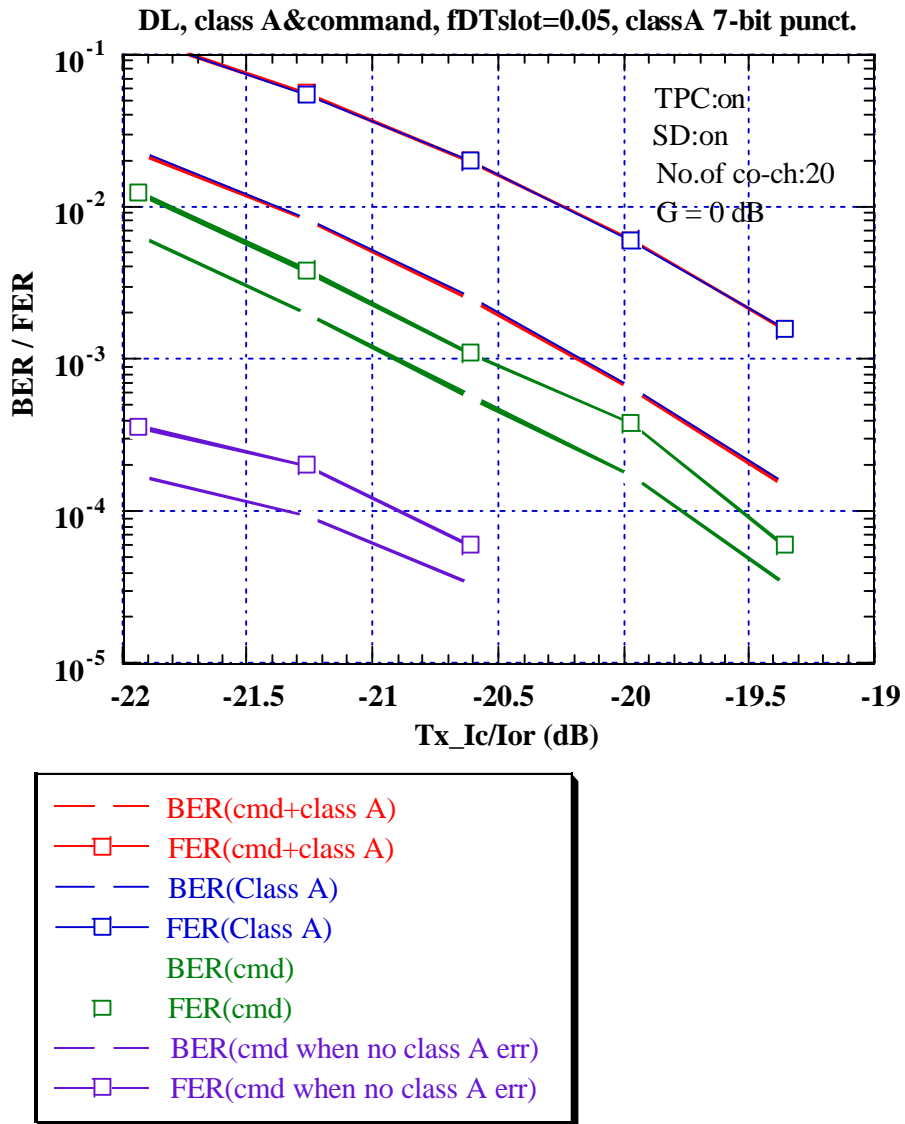


Figure 3. FER performance of class-A bits and command bits

From Figure 3, we can see that there is almost no FER(cmd + class A) increasing compared to FER (class A) and the probability of command block error when no class A block error is less than 1% of FER (class A)

## **5. Conclusion**

NTT DoCoMo proposes a parallel AMR command signalling scheme and a efficient AMR command bits transmission scheme.