TSG-RAN Working Group 1 meeting #7 *TSGR1-d05/99*
Hannover, Germany August 30 – September 3 1999

Agenda Item:	**Adhoc 8**
Source:	**Hyundai Electronics & Shinsegi Telecomm.**
Title:	**A Modified CMCCH(Compressed Mode Common Channel)**
Document for:	**Approval**

1. Introduction

Hyundai and Shinsegi proposed a method of compressed mode(CM) using common channel, CMCCH [1][2]. As explained at the last meeting, the concept of CMCCH is to fix the OVSF code of CMCCH initially and UEs, which enter CM, use the code and the repeated code to meet the SF of UE with the concept of time-sharing. That method can easily maintain OVSF code for CM, but has a problem which wastes the source of OVSF code because one OVSF code has to be assigned even if there is no UE in CM. To solve this problem, modified method is proposed in this document.

2. Modified CMCCH

The concept of modified CMCCH is similar with that of the presented CMCCH. That is, the data during compressed frame are transmitted through DPCH and CMCCH at the time without collision with other UEs in CM.

The difference between the presented and the modified CMCCH is that the assignment of OVSF code of CMCCH isn't done initially, but whenever UE enters CM. And if we consider that the concept of time-sharing, which is main idea of CMCCH, and the SF of new UE is equal to or more than the SF of CMCCH, then the OVSF code for CMCCH is the same as the OVSF code for the existing UE or the child OVSF code of existing one.

So, this proposed CMCCH can increase the effectiveness of OVSF code for CM.

3. Examples

Modified CMCCH has some properties. In this chapter, those properties are explained.

3.1 When the SF of UE is equal to or more than the SF of CMCCH.

In this case, CMCCH can support those UEs with the assigned OVSF code and child OVSF code.

If the TGP is N frames and the TGD is 0 slot, the best case and worst case is 2N-1 UEs and N-1 UEs, respectively. (refer to [1]). Even if we consider the worst case only, the effectiveness of CMCCH is N-1 times than SF 1/2 reduction method. Because SF reduction method assigns an OVSF code per UE.

3.2 When the UE, which SF is the smallest in CMCCH, leaves CM.

We assume that the smallest SF in CMCCH is SF(a), the second smallest SF is SF(b) and the SF(b) is a child of SF(a). If the UE with the OVSF code, which SF is SF(a), leaves CM, then the SF of CMCCH isn't SF(a), but SF(b) in that time. In this case, the child of OVSF codes of SF(a) can be used for UEs in normal mode except for the branches with the SF(b).

So, the flexibility of OVSF code is increased.

3.3 When CMCCH and SF Reduction method are combined.

This case is a different from previous examples.

Example 1 and 2 are a kind of multi-code method.

However, if CMCCH and SF Reduction method are combined, that is, SF of compressed frame is reduced as half, then the data can be transmitted through CMCCH only. This means that the data during compressed frame is transmitted through a single common channel, CMCCH.

In the previous examples, the SF of CMCCH is the same as one of UE. However, in this case, the SF of CMCCH is half of SF of UE. If a new UE, with more than SF of CMCCH, enters CM, CMCCH can use the assigned OVSF code and the child OVSF code of the existing one.

So, CMCCH method can support the UE without the role of multi-code, if CMCCH and SF Reduction method are combined.

3.4 When the OVSF code can't be assigned to CMCCH in primary scrambling code.

This case can be happen if there are many UEs with several SFs. In that case, we can't use CMCCH only with OVSF code in primary scrambling code. But there have been on-going discussion the usage of secondary scrambling code in CM [3]. If we also use the usage in CMCCH, we can solve this code shortage problem.

4. Conclusion

The modified CMCCH is different from the presented CMCCH is the point of assignment of OVSF code for CMCCH. However, the advantage of modified CMCCH can decrease the waste of OVSF code in the presented

CMCCH. Of course, the method includes the advantages of the presented CMCCH such as:

- Ease of maintenance of OVSF code
- Support of any transmission gap without increasing complexity of system
- Ease of transmission of TFCI in a compressed frame

And, if SF reduction method and the usage of secondary scrambling code is used in CMCCH, CMCCH can support the CM of the single-channel UE and cord shortage problem, respectively.

From the above advantages, we strongly recommend that our scheme be used for DL CM.

5. Reference

[1] "New scheme for downlink compressed mode using common channel", TSGR1#6(99)842, Hyundai Electronics & Shinsegi Telecomm, TSG-RAN working Group 1 meeting #6, Espoo, Finland 13-16, July 1999

[2] "A Scheme for downlink compressed mode using common channel, CMCCH", TSGR1#7(99)b10, Hyundai Electronics & Shinsegi Telecomm, TSG-RAN working Group 1 meeting #7, Hannover, Germany 30 Aug – 3 Sep 1999

[3] "Use of multiple scrambling codes in compressed mode", TSGR1#7(99)b27, Ericsson, TSG-RAN working Group 1 meeting #7, Hannover, Germany 30 Aug – 3 Sep 1999