

Source: HITACHI

Subject: A method to control the CPCH access preamble transmission probability

Document for: Discussion

1. Summary

We propose a method to control the CPCH access preamble transmission probability.

2. Background and Discussion

Regarding CPCH packet transmission scheme, a number of proposals have been made to improve the CPCH scheme in the access phase[1]-[4]. These proposals are efficient to decrease the collision probability of CPCH and CPCH delay.

In these proposals and current working assumption, UE transmits its CPCH access preambles regardless of the number of available CPCHs, that is to say, the number of access preambles transmitted by UEs is the same whether there are 16 available CPCHs or only 1 available CPCH.

For example, when there is only one available CPCH, only one access preamble can reserve the CPCH and the others are of no use. These wasted access preambles would interfere seriously on both CPCH access preamble and other uplink channels.

3. Proposal

We introduce the parameter *access preamble transmission probability*. This parameter is broadcasted by Node B, and UE decides to transmit an access preamble according to this parameter.

Details of our proposal are as follows:

1. Node B calculates the uplink *access preamble transmission probability* P_{APT} . The value of P_{APT} would be decided from the total number of available CPCHs. The maximum number of CPCH is 16, thus P_{APT} could be represented by a 4bit word.
2. Node B broadcasts P_{APT} at suitable rate(e.g. every 10ms frame). There are several methods to broadcast P_{APT} , such as using BCH, AICH or PICH. Considering the characteristics of each channel, we agree to Philips' opinion in [5], Node B broadcasts P_{APT} using the unused bits in PICH.
3. A UE wishing to send a packet reads P_{APT} broadcasted on PICH.
4. The UE decides whether it transmits the access preamble or not according to P_{APT} . For example, the UE randomly selects a number x which is uniformly distributed over the interval 0 to 1, and if x is less than P_{APT} , UE transmits the access preamble, otherwise UE does not transmit the access preamble.

4.

By broadcasting *access preamble transmission probability* P_{APT} , Node B is able to control the number of access preamble sent from UEs. Thus, the number of wasted access preambles that can not reserve the CPCH is decreased. This would minimize the interference on both downlink/uplink.

Related to previous item, the number of access preambles transmitted in the same timeslot is decreased, thus the interference among the access preambles would be reduced. This could improve the throughput of access preamble.

Owing to the control of access preamble transmission probability, UE need not to transmit access preambles that are of no use. This could extend UE's battery life.

Any of existing proposals[1]-[4] and current working assumption can be improved by adopting this control method. When this method is used together with Philips proposal[3], some changes need to be considered about the use of unused bits in PICH.

5. Reference

- [1] TSGR1#7(99)799, "CPCH related issues and concerns", GBT
- [2] E-mail discussion sent to WG1 reflector on 21/7/99, "Re:AH14 GPT Contribution on CPCH [for further discussion]", Clement Fisher, Anite Telecom
- [3] TSGR1#7(99)b37, "Enhanced CPCH with status monitoring and code assignment", Philips
- [4] E-mail discussion sent to WG1 reflector on 16/8/99, "AH14: New proposal for CPCH", Young D. Lee, LGIC
- [5] TSGR1#7(99)b38, "Status information for CPCH", Philips