TSG-RAN Working Group1 meeting #18 TSGR1#18(01)0116

Boston, USA, January, 15th – 18th, 2000

Agenda Item	**:**	**AH24 : High Speed Dowlink Packet Data Access**
Source	**:**	**Nortel Networks**
Title	**:**	**Text proposal for TR25.848 on physical layer structure**
Document for	**:**	**Discussion and approval**

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1. Introduction

During RAN1#17 in Stockholm a number of documents were discussed ([1],[2],[3],[4]) which dealt different approaches regarding time and code multiplexing issues for HSDPA.

In [1] a number of alternatives were listed and discussed. [2], [3] and [4] contain different proposals more or less close to the actual possibilities offered by release 99 DSCH.

It was agreed to include in the technical report 25.848 a description and summary of the issues related to time and code multiplexing. In this contribution we list again all the alternatives which were discussed. A text proposal is also enclosed and proposed to be included in the technical report.

2. Summary of the approaches for the High speed downlink packet data access model

?? as in the existing release 99 DSCH, only the physical channel is shared between users i.e. the transport is not shared. This means that the set of transport formats which can be used on the high speed shared channel is defined UE per UE and is not common. With this approach we still keep all the flexibility in time and code multiplexing : users may be multiplexed in code an time. A given UE can may get a varying number of codes of different spreading factors each TTI.

?? the second possibility is to restrict the flexibility of the above described solution i.e. the spreading factor is fixed on all codes for all users. However users can still be multiplexed in time and code TTI per TTI.

?? the 3rd possibility extends the concept of shared channel to the transport format level instead of physical channel level as in existing release 99 DSCH. This means that the set of transport format supported by the HS-DSCH is common to all users possibly depending on the UE capabilities. To be more precise a certain capability for UEs would allow only a very restricted set of transport formats then UEs with larger capabilities could support this first of TFC plus some additional ones and so on. In terms of physical channel mapping, users can be multiplexed in code and time with varying spreading factors on a TTI basis

?? the 4th possibility is the same as the previous one only constraining the spreading factor to be fixed.

3. Text proposal

----------Beginning of text proposal for HSDPA TR ----------

6 Proposed Physical Layer Structure of High Speed Downlink Packet Access

6.1 Basic Physical Structure <frame length, update rate, spreading codes,etc>

~~On the physical layer, HSDPA transmission should be carried out on a set of downlink physical channels (codes) shared by users at least in the time domain and possibly also in the code domain.~~

On the physical layer it has been proposed that HSDPA transmission would be carried out on a set of physical channels shared by users in time. In turn this means that both code and time multiplexing of users is employed during HSDPA transmission.

6.1.1 HSDPA physical-layer structure in the code domain

In the code domain, it has been proposed that HSDPA transmission would use a fixed spreading factor and multi-code transmission. The selection of such a fixed HSDPA spreading factor should be based on an evaluation of the impact on

- Performance
- UE complexity
- Flexibility (granularity in the overall allocation of capacity for HSDPA transmission)

Considerations should also be made on to what possible extent there could be any additional flexibility advantages in supporting a variable spreading factor for HSDPA, and compare these with the impact on complexity etc.

6.1.2 HSDPA physical-layer structure in the time domain

In the time domain, the support of HSDPA TTI shorter than one radio frame (10 ms) has been proposed. The length of such shorter HSDPA TTI should be selected from the set {T_{slot}, 3?T_{slot}, 5?T_{slot}, 15?T_{slot}}. The selection of such shorter HSDPA TTI should be based on an evaluation of the impact on

- Performance
- Delay
- Network and UE complexity
- Flexibility (HSDPA payload granularity)

6.1.3 HSDPA physical layer alternatives

A number of possible alternatives have been discussed in RAN1 to cope with user multiplexing.

?? HSDPA physical channels could offer the same level of flexibility as release 99 DSCH i.e. the physical channel is shared between users on a TTI basis which means that users can be multiplexed in code and or time on a TTI basis (whatever the TTI chosen for HSDPA). Each user can possibly have a variable number of codes and spreading factor and uses a specific set of transport formats.

?? HSDPA could use the same flexibility in terms of multiplexing as release 99 DSCH though using a fixed spreading factor.

?? HSDPA could use a common set of transport formats for all UEs depending on their capabilities. Each set of transport formats would correspond to a type of transport format capability. If the set of HSDPA transport format capabilities is ordered then each type of HSDPA transport format capability is contained in the previous one. This alternative can be used with the time and code multiplexing flexibility offered by release 99 DSCH

?? HSDPA could use the above described shared transport format concept only constraining the spreading factor to be fixed and identical for all users.

----------End of text proposal for HSDPA TR ----------

4. References

[1] : Downlink model for High Speed Downlink Packet Access, R1-00-1441, Nortel Networks

[2] : High Speed Downlink packet data Access, R1-00-0727, Motorola

[3] : Downlink Transport Channel Multiplexing Structure for HSDPA , R1-00-1383, Lucent

[4] : Downlink and Uplink Channel Structures for HSDPA , R1-00-1381, Lucent