Exhibit 1003

TSG-RAN Working Group 1 #30 **Tdoc R1-030004**
San Diego, USA
January 7-10, 2003

Source: **Siemens**

Title: **Downlink Control Channel Configuration for Enhanced Uplink Dedicated Transport Channel**

Agenda Item: **AH 64 (Enhanced Uplink DCH)**

Document for: **Discussion and Decision**

1. Introduction

In 3GPP TSG RAN WG1 a feasibility study on enhanced uplink dedicated Transport Channel (denoted as EU-DCH in the sequel) for UTRA FDD has started. The general idea of this study is to investigate performance enhancement techniques, like adaptive modulation and coding, HARQ and fast scheduling in combinations with shorter frame sizes. In this paper possible configurations of the associated downlink control channel are addressed. In particular the re-use of HS-SCCH versus the definition of a new shared control channel is discussed.

2. Re-use of HS-SCCH

Re-using the existing HSDPA downlink control channel (HS-SCCH) is a means to alleviate the downlink code resource problem by providing trunking gain between EU-DCH and HS-DSCH users. This is achieved by reusing the downlink HS-SCCH also for downlink control information of EU-DCH (denoted as EU-SCCH in the sequel). Consequently, EU-SCCH uses also a 3-slot format and is time-aligned at Node B with HS-SCCH transmissions. This particular format for EU-DCH associated downlink control information allows the same shared control channel to be used for EU-DCH and HSDPA users in time multiplex. Downlink code resources are saved, since the Node B has more flexibility in HS-SCCH/EU-SCCH usage and can more often assure that the codes allocated to HS-SCCH and EU-SCCH are fully utilised in the time domain. The number of HS-SCCH channels is adopted to the joint traffic of HSDPA and EU-DCH. Additionally it decreases UE complexity, since less control channels need to be monitored in cases where HS-DSCH and EU-DCH are used concurrently.

A further simplification of the UE implementation is possible if exactly the coding format of HS-SCCH part 1 is re-used. This is possible if the signalling payload is four bits or less. As shown in Fig. 1, the HS-SCCH part 1 provides 8 unused codewords within the channelisation code-set field (denoted as "redundant area" in Fig. 1, [1]), which could be used for EU-DCH downlink signalling.

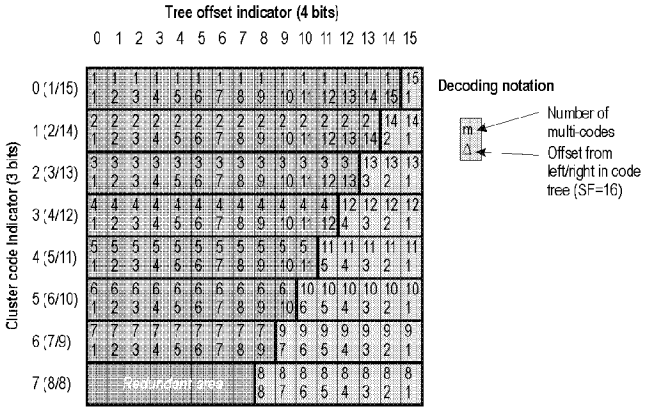

Fig 1: Reuse of the redundant area of HS-SCCH part 1 for downlink signalling of EU-DCH

Furthermore, the modulation bit of HS-SCCH part 1 can be used for different purposes in EU-DCH[1]. A major benefit of the re-use of HS-SCCH channel *and* coding format is that the detection based on the implicit UE-ID and decoding of part 1 is identical for HSDPA and EU-DCH data transmission and receiver implementation is notably simplified. Note, that current proposals differ significantly in the number of required downlink signalling bits [2, 3]. If the total downlink signalling payload is less or equal to four bit, only part 1 could be used.

3. New Downlink Shared Control Channel

Another alternative is to define a new shared control channel for EU-DCH. In this case no trunking gain is obtained and additional downlink code resources are required. However, in this case the format and coding of this control channel can be optimised for the payload size. In particular if few downlink signalling bits are required, higher spreading factors (e.g., SF = 256 or 512) than applied to HS-SCCH can be used and/or shorter sub-frame duration can be adopted (which allows to accommodate more users per channel in time-multiplex). Thus the total code consumption of this alternative might not be significantly higher than of re-using HS-SCCH. Note, that anyhow, it is favourable not to schedule too many EU-DCH users concurrently to keep the dynamics of the noise rise within feasible limits. The main benefit of this approach is that the detection and decoding performance of this control channel can be optimised for the given payload and that it is not related to the performance of HS-SCCH. Another benefit is, that a separate downlink control channel would allow higher flexibility in relative channel timing, the resulting round trip delay, and available processing times at UE and Node B.

4. Conclusions

This paper investigates different possibilities for configuration of the downlink control channel for EU-DCH. The re-use of HS-SCCH for EU-DCH downlink signalling is compared to the definition of a new shared channel with higher spreading factor and/or shorter frame size. The former strategy offers trunking gain between HSDPA and EU-DCH operation, i.e., improves downlink code consumption. A further advantage is that the detection based on the implicit UE-ID and decoding is identical for HSDPA and EU-DCH. Thus receiver implementation is notably simplified. However, if a new shared downlink channel for downlink control signalling is used, the format and coding can be optimised for the given payload size. Depending on the payload size, higher spreading factors (e.g., SF = 256 or 512) or shorter sub-frame duration can be adopted. Thus the total code consumption of this approach might not be significantly higher. The preference for one of these two possibilities will mainly depend on the size of the downlink control signalling payload.

5. References

[1] 3GPP TSG RAN WG 1 Tdoc R1-02-0018, Nokia, "Compact signalling of multi-code allocation for HSDPA, version 2," Espoo, Finland, January 2002,

[2] 3GPP TSG RAN WG 1 Tdoc R1-02-1277, Nokia, "Two Threshold Node B Packet Scheduling," Shanghai, China, November 2002,

[3] 3GPP TSG RAN WG 1 Tdoc R1-02-1350, Motorola, "Design Considerations for Enhanced Uplink Dedicated Channel," Shanghai, China, November 2002.

[1] If fast CQI signalling is adopted the number of available codewords is slightly less than 16.