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Title: Physical Channel Segmentation and 2nd Interleaving for TDD

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1 Introduction

Up to now the chapters in [1] describing the physical channel segmentation as well as the 2nd interleaving are identical to the respective chapters in [2] reflecting the decision for FDD to use in case of multicode transmission always the same spreading factor. However, especially for TDD it is beneficial to allow a finer granularity when assigning physical channels to a user, in order to increase the number of available resources and therefore to avoid a possible code shortage.

Moreover, according to the current scheme the second interleaving is always performed to each physical channel separately. While for FDD with each code spread over a total frame period this is the optimum solution, for TDD a higher flexibility is required: On one side, to maximise the possible time diversity, each CCTrCH should be interleaved over all timeslots which are available. On the other side, data blocks with just a little redundancy should be transmitted within one timeslot, since then the probability of data loss due to fast fading is reduced. However, to compensate the different susceptibility of various channelisation codes to interference, combined interleaving should always be applied over all codes within one timeslot.

2 Schemes for physical channel segmentation and 2nd interleaving

In figure 1 and 2 the current as well as the proposed scheme for physical channel segmentation and 2nd interleaving is depicted, respectively, including the 2nd multiplexing and the physical channel mapping:

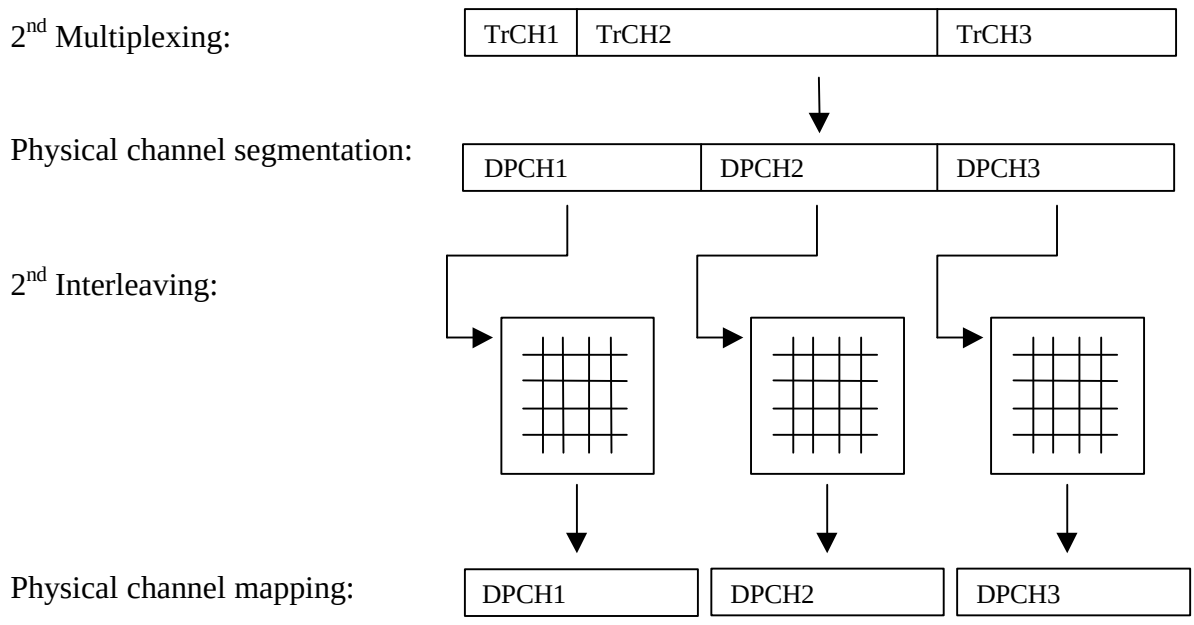

Figure 1: Current scheme for Physical channel segmentation and 2nd interleaving for TDD

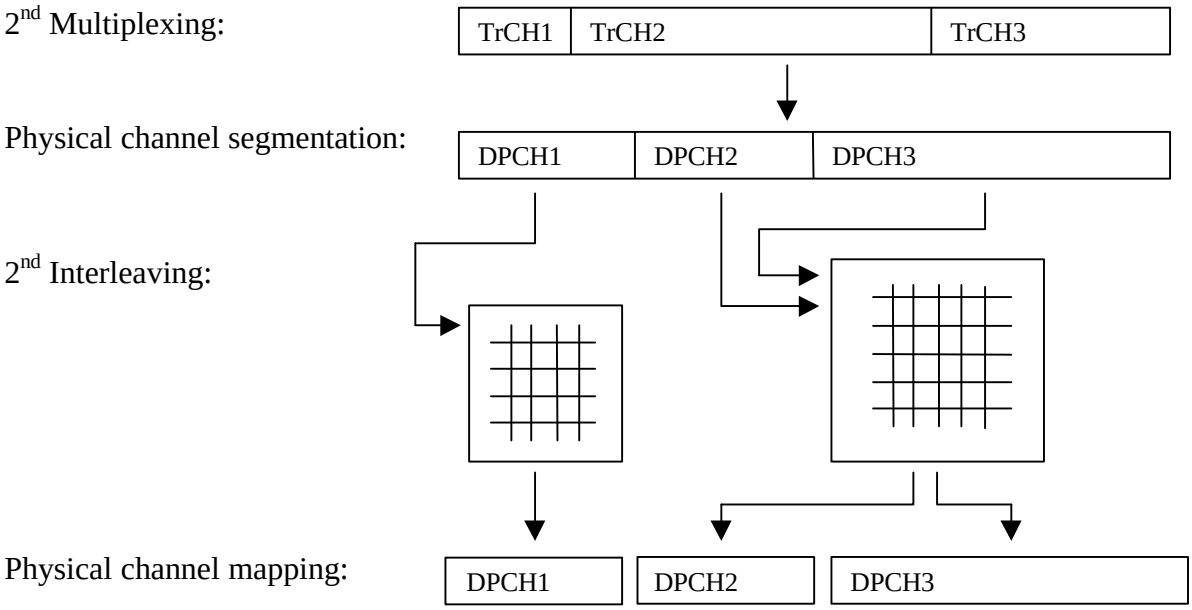

Figure 2: Proposed new scheme for physical channel segmentation and 2nd interleaving for TDD

In both schemes, first the 2nd multiplexing will be carried out the same way as for FDD, which means that the transport blocks of all TrCH will be written one after the other in one common data stream.

In the next step of the generic multiplexing scheme, the physical channel segmentation, in addition to the current scheme now the application of different spreading factors is enabled. For this purpose, the algorithm given in [3] can be simply modified taking into account the different capacities of the respective channelisation codes.

Regarding 2nd interleaving, with the current scheme this is always applied to each physical channel separately as shown in figure 1. With the proposed new scheme it is possible to combine several physical channels by means of writing them consecutively in the same 2nd interleaving matrix, see figure 2. As for FDD, the number of columns is these matrices is always 30, and the number of rows will be determined in order to fit to the respective number of data bits. By means of applying the 2nd interleaving to a combination of physical channels, both required interleaving methods described in the introduction can be simply realised: Either the interleaving is performed over all physical channels, which means that only one 2nd interleaving matrix is required. Alternatively, combined interleaving is applied only on those physical channels which are transmitted within the same timeslot.

During the last step, the physical channel mapping, the colomns of the 2nd interleaver matrices are written into those DPCH, whose data has been combined during the interleaving step, respectively.

3 Conclusion

For TDD channelisation codes with different spreading factors are required. In addition it should be possible to apply the 2nd interleaving to a combination of physical channels in order to deal with the effect of varying interference in different timeslots. For this purpose, in this paper we propose a simple and straightforward method to incorporate the required flexibility in the generic multiplexing scheme.

4 References

[1] TSG RAN WG1, “TS 25.222 Multiplexing and channel coding (TDD)”

[2] TSG RAN WG1, “TS 25.212 Multiplexing and channel coding (FDD)”

[3] TSGRAN WG1 #6(99)892, “Detailed description of Radio frame segmentation to 2nd interleaver”, source: SAMSUNG