TSG-RAN Working Group 2 (Radio layer 2 and Radio layer 3) *TSGR2#2(99)084*
Stockholm 8th to 11th March 1999

Agenda Item: 8.3.2

Source: Siemens AG

Title: Impact on Network elements for the use of Hybrid ARQ Type II/III in the UTRAN

Document for: Decision

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1. Introduction

Recently, the performance of various Hybrid ARQ schemes was compared in selected simulation cases [1, 2] for the UTRA. It was proposed that both hybrid ARQ types, i.e. Type I and Type II/III, has to be supported by the protocol in TDD mode.

The performance of various ARQ schemes might be critically affected by the proposed Radio Protocol Termination Points. Therefore in the following some more information is given according a request from last the L23 Expert Group meeting and also mentioned in the minutes.

The scope of this contribution is to deliver material for discussion on hybrid ARQ issues as proposed in the last meeting.

2. Functional *Split*

In this approach the whole RLC/MAC functionality is in the RNC. This implies that fast DCA and signalling has to be done via the Iub interface. The data are transmitted as decoded bits with CRC in case of RT and NRT with Hybrid ARQ Type I. In case of an NRT service with Hybrid ARQ Type II/III maximum ratio combining is performed by the Node B.

The working assumption is an L1 termination in Node B which fulfils the following functions
1. Decoding of the CRC
2. Buffering (only Hybrid ARQ Type II/III)
3. Maximum Ratio Combining MRC (only Hybrid ARQ Type II/III)

The following figures show a simplified message transport in case of a Hybrid ARQ type II Protocol. An MRC technique is used from the 2nd retransmission. The number of data retransmission is limited and adjustable. The figure on **page 2** shows the down-link message flow and the figure on **page 3** shows the up-link message flow.

Note: The relations between RRC & RLC and RRC & MAC are not shown in this figures explicitly. It is assumed that the MAC operates inside a given allocation range, which is controlled by the RRC.

3. Conclusion

As shown in the figures the use of the hybrid ARQ mechanism is possible also under respect that the RLC/MAC is terminated in the RNC. Therefore, it is proposed to incorporate this information into YY.22 [3] by adding a sub-chapter 9.7.1 with title “Use of hybrid ARQ operation within the RLC protocol”.

4. References

[1] *ARQ error control techniques*, Source: Siemens,

Tdoc SMG2 UMTS-L23 307/98.

[2] *Comparison of Hybrid ARQ Types I and II-III for TDD Mode*, Source: Siemens, Tdoc SMG2 UMTS-L23 436/98 (Source: Siemens).

[3] UMTS YY.22, Description of the RLC protocol