TSG-RAN Working Group 3, meeting #6
Sophia Antipolis, 23-27 August 1999.

TSG R3#6(99)922

Agenda Item: 14.1

Source: **Ericsson**

Title: Uplink Quality Estimate in the DCH Frame Protocol

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1. Introduction

This contribution aims to clarify the uplink Quality Estimate (QE) in [25.427]. We propose that the physical channel BER is used as uplink quality estimate. A proposal of how the QE information field can be coded is found in [R3_923].

2. Description

TSG RAN WG2 have already decided on a Node B measurement, defined as "Physical Channel BER" [25.302]. TSG RAN WG3 needs to decide on the transport for this measurement [see also 1].

TSG RAN WG3 have defined a quality estimate field in the DCH Frame Protocol, but what entity to use for quality estimate is not defined. We propose that the quality estimate is defined as the Physical Channel BER.

With this definition we achieve the following:

First, the physical channel BER can be used by the macro diversity combination unit, to select a transport block when all transport blocks show incorrect CRC.

Second, the outer loop power control algorithm, which adjusts the SIR target of each DCH, needs a fast quality estimate to guarantee the quality of service and at the same time utilize a minimum of the radio resources. In order to detect when a DCH has "too good quality" we need a quality estimate that is not only based on FER since that would take too long time to get a good accuracy when we have few frame errors. For these reasons, we propose that the physical channel BER, i.e. the BER before decoding, is transported up to the SRNC. The strong relation between the physical channel BER and decoded BER/FER is useful for the design of an efficient outer loop power control.

We also note that TSG RAN WG2 have defined this measurement to be "on-demand", "periodic" and "event-triggered". By transporting the physical channel BER in the DCH Frame Protocol, these reporting criteria become SRNC internal, and need no further specification.

Assuming log_{10}*(physical channel BER)* ranging from approximately –4.0 to –0.3 and a resolution of 0.1 we see that we need approximately 37 values for representing the physical channel BER. Thus, the quality estimate field should consist of approximately 6 bits.[1]

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[1] The exact range, resolution and requirements should be specified by TSG RAN WG1 and TSG RAN WG4.

3. Proposals

We propose the following changes to 25.427:

Quality Estimate: The quality estimate is defined as the physical channel BER, see [ref 25.302]. ~~A~~The ~~-~~quality estimate ~~of the physical channel~~ is needed in order to select a transport block when all CRC indications are showing bad (or good) frame. The UL Outer Loop Power Control may also use the quality estimate. ~~The use and definition of the quality estimate is FFS.~~

4. References

[25.302] Services Provided by the Physical Layer, v2.4.0

[25.427] UMTS 25.427, Iur/Iub User plane protocol for DCH data streams, v.0.3.1

[R3_923] Length of information fields for DCH FP, Tdoc TSG R3#6(99)923