3GPP TSG-RAN meeting #19 ***RP-030185***
Birmingham, UK, 11 – 14 March, 2003

Source: Alcatel, Interdigital, Orange, Siemens

Title: Definition of TFCI transmit power on S-CCPCH in case of no data

Agenda item: 8.3.2

Document for: Discussion and decision

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1. Introduction

When in a S-CCPCH frame, neither PCH nor FACH data has to be transmitted, the way to fix the TFCI bits power is currently not specified in TS 25.133 [1]. Indeed, in this case, no transmit power level is defined for S-CCPCH data bits in the 3GPP standard, since no data bits needs to be transmitted. Therefore, the TFCI and Pilot powers are undefined as well, since they expressed relatively to the power of the S-CCPCH data bits.

This problem was recognised in both RAN WG1 and RAN WG3 and after some discussions, a CR [2] was agreed by RAN WG3 to specify the behaviour in this case.

The contribution [5] proposed to not approve this CR in RAN. However, this contribution does not give any new argumentation that has not been already discussed in both RAN WG1 and RAN WG3. Therefore, we do not see any reason why the RAN WG3 decision should be modified during this RAN meeting.

2. Unspecified behaviour

When there is not a TFCI corresponding to 'no transmission on all transport channels multiplexed on the S-CCPCH', it is already specified in [1] that no pilot and TFCI bits shall be transmitted.

On the contrary, when such TFCI is defined, [1] specifies that TFCI shall be transmitted. However, as mentioned previously, the TFCI power is not defined in this case. The aim of the CR [2] is to solve this lack in the specifications.

Such lack in the 3GPP specifications is not acceptable, all the more since this situation happens in common test environment defined for UE conformance tests in TS 34.108 [3]. Indeed, since the TFCI power setting may impact the UE behaviour, this has to be fully specified.

The need to specify this case was recognised by many companies in both RAN WG1 and RAN WG3.

As a result of the discussions, this lack in the specifications was agreed by RAN WG1, as mentioned in the LS sent to RAN WG3 [4]:

"RAN WG1 confirms that defining a TFCI value for no data in S-CCPCH is a valid possibility"
"RAN WG1 agrees with RAN WG3 that an action should be taken in order to specify this case"

It was also agreed in RAN WG3 since the CR [2] was approved.

3. Terminal power saving

The contribution [5] questioned the gain on the terminal battery consumption that could be achieved by transmitting the TFCI in case of no data on the S-CCPCH.

We do not agree with this statement and we believe that some gain may be achieved for some UE implementations, since the TFCI indication when there is no data will enable the UE to know that data does not need to be received and decoded. In addition, the cost of transmitting the TFCI power in the cell is very low since the number of TFCI bits in the S-CCPCH slot format is quite small. This was recognised by several companies.

In addition, we would like to point out that the current standard already enables manufacturers or operators to not transmit the TFCI in case of no data, if they believe that this is the best configuration. This can be achieved by two possibilities:
- Choose a S-CCPCH slot format without TFCI bits. In this case, TFCI will never be transmitted in the cell.
- Choose a S-CCPCH slot format with TFCI bits, but do not define any TFCI value for the 'no-data-case. In this case, TFCI will only be transmitted when data will be transmitted on the S-CCPCH.

4. TFCI transmission

In general, from physical layer point of view, there is no need to define a TFCI value for no data if this TFCI value is not broadcasted in the cell. Indeed, the only purpose of the TFCI is to be transmitted to the receiver to improve its performance.

In case of dedicated physical control physical (DPCCH), it is already specified that the TFCI is transmitted, even when no data is transmitted on the DPDCH. The TFCI power is also clearly defined in this situation.

Therefore, in case a TFCI is defined for no data on the S-CCPCH, the normal way is also to transmit it on the radio interface.
If this is believed to be not useful for the UE, no TFCI shall be defined for no-data on the S-CCPCH, with is not prevented by the current CR. In which case, the TFCI will not be transmitted when there is no data on the S-CCPCH.

5. Simple solution

The proposed solution in the CR is quite simple and does not require any signalling or complex algorithm, since it only specifies the value of the TFCI power and from information already known in the Node B. In addition, it is only proposed for 3GPP R5 release.

6. References

[1] TS 25.433 v5.2.0, "NBAP protocol", September 2002

[2] R3-030356, "CR 25.435-095r2 (Rel5) : S-CCPCH power setting in case of no data transmission", Alcatel

[3] TS 34.108 v3.7.1, "Common tests environment for UE conformance testing", March 2002

[4] RP-030159, "Definition of TFCI transmit power on S-CCPCH in case of no data", Ericsson & NTT DoCoMo

[5] R1-030375//R3-030344, “Answer LS on S-CCPCH power setting in case of no data transmission”, Liaison statement sent by RAN WG1 to RAN WG3