TSG-RAN Working Group 1 meeting #11
San Diego, USA
February 29 – March 3, 2000

TSGR1#11(00)0226

Agenda item: Ad Hoc 1

Source: Siemens

Title: Update of TS 25.222 - clarification of BTFD for TDD

Document for: Approval

Introduction

Blind transport format detection (BTFD) has been introduced both for FDD and TDD to avoid the transmission of TFCI bits for certain services in order to reduce interference caused by signalling. BTFD is an interesting option especially for FDD DL. Here, discontinuous transmission (DTX) is applicable, which allows a simple implementation of BTFD in the mobile by means of a straightforward approach for convolutional encoded TrCH.

For TDD however, this method is not feasible since dynamic rate matching is applied both in uplink and downlink, which prevents the application of such a straightforward algorithm, see [1]. As an alternative it would be possible to use a more sophisticated algorithm which tries to decode all possible transport format combinations (TFC). However, this costs additional effort, which has not been evaluated in detail up to now.

In any case, BTFD is restricted to a quite low number of different TFC with certain other restrictions as currently discussed on the reflector. Although not mentioned explicitly, those restrictions are defined that way to fit exactly the requirements of AMR speech transmission including additional signalling.

On the other side, while for FDD the overhead for the TFCI is quite high, since always at least 30 bits must be transmitted, for TDD the TFCI length is scalable in the range of 0 up to 32 bits, dependent on the number of different TFC. Therefore, only a low number of TFCI bits is needed in those cases, which might be handled alternatively by means of BTFD. Considering this reduced overhead, for TDD a far lower gain of BTFD in comparison to TFCI transmission can be expected.

However, also for TDD the implementation of an BTFD algorithm is a valuable option to improve the detection reliability especially for services with low BER.

Proposal

Based on the motivation given in the former paragraph it is proposed that for all CCTrCH the transmission of a TFCI is assumed. This includes the transmission of a TFCI with length zero if only one TFC is defined.

In addition, BTFD may be used as an implementation option to improve the detection reliability.

It is for further study, if BTFD shall be introduced for release 2000 as a mandatory feature, which has to be supported both, in the node B and the mobiles.

Furthermore, the enclosed CR contains a small correction regarding the use of the puncturing limit (PL). For TDD, this parameter is used not only for uplink but also in downlink, since dynamic rate matching is applied in both directions.

References

[1] TSG RAN WG1, “TS 25.222 “Multiplexing and channel coding (TDD)”, V3.1.0

[2] TSG RAN WG1, “TR 25.833 “Physical layer items not for inclusion in release 99”, V1.0.0

3GPP TSG RAN WG1 Meeting #10
Beijing, China, January 18th-21st 2000

Document
e.g. for 3GPP use the format TP-99xxx
or for SMG, use the format P-99-xxx

CHANGE REQUEST

Please see embedded help file at the bottom of this page for instructions on how to fill in this form correctly.

25.222	CR	023	Current Version:	V3.1.1

GSM (AA.BB) or 3G (AA.BBB) specification number ↑ *↑ CR number as allocated by MCC support team*

For submission to:	TSG RAN#7	for approval	X	strategic		(for SMG use only)
list expected approval meeting # here ↑		for information		non-strategic		

Form: CR cover sheet, version 2 for 3GPP and SMG *The latest version of this form is available from: ftp://ftp.3gpp.org/Information/CR-Form-v2.doc*

Proposed change affects: *(at least one should be marked with an X)*

(U)SIM	ME	UTRAN / Radio	Core Network
	X	X	

Source: Siemens AG **Date:** 22.02.2000

Subject: Update of TS 25.222 - clarification of BTFD for TDD

Work item: TS 25.222

Category: *(only one category shall be marked with an X)*

F	Correction	X	**Release:**	Phase 2	
A	Corresponds to a correction in an earlier release			Release 96	
B	Addition of feature			Release 97	
C	Functional modification of feature			Release 98	
D	Editorial modification			Release 99	X
				Release 00	

Reason for change:
- Correction concerning the application of the puncturing limit (PL)
- Clarification of BTFD for TDD

Clauses affected:

Other specs affected:

Other 3G core specifications		→ List of CRs:
Other GSM core specifications		→ List of CRs:
MS test specifications		→ List of CRs:
BSS test specifications		→ List of CRs:
O&M specifications		→ List of CRs:

Other comments:

help.doc

<--------- double-click here for help and instructions on how to create a CR.

3 Definitions, symbols and abbreviations

3.1 Definitions

For the purposes of the present document, the [following] terms and definitions [given in ... and the following] apply.

TrCH number: Transport channel number represents a TrCH ID assigned to L1 by L2. Transport channels are multiplexed to the CCTrCH in the ascending order of these IDs.

3.2 Symbols

For the purposes of the present document, the following symbols apply:

éxù	round towards ¥, i.e. integer such that $x \pounds éxù < x+1$
ëxû	round towards -¥, i.e. integer such that $x-1 < ëxû \pounds x$
çxç	absolute value of *x*

Unless otherwise is explicitly stated when the symbol is used, the meaning of the following symbols are:

i	TrCH number
j	TFC number
k	Bit number
l	TF number
m	Transport block number
n	Radio frame number
p	PhCH number
r	Code block number
I	Number of TrCHs in a CCTrCH.
C_i	Number of code blocks in one TTI of TrCH *i*.
F_i	Number of radio frames in one TTI of TrCH *i*.
M_i	Number of transport blocks in one TTI of TrCH *i*.
P	Number of PhCHs used for one CCTrCH.
PL	Puncturing Limit ~~for the uplink~~. Signalled from higher layers
RM_i	Rate Matching attribute for TrCH *i*. Signalled from higher layers.

Temporary variables, i.e. variables used in several (sub)sections with different meaning.

x, X
y, Y
z, Z

4.2.13 Transport format detection

Transport format detection can be performed both with and without Transport Format Combination Indicator (TFCI). If a TFCI is transmitted, the receiver detects the transport format combination from the TFCI. When no TFCI is transmitted, so called blind transport format detection may be used, i.e. the receiver side uses the possible transport format combinations as a priori information.

4.2.13.1 Blind transport format detection

Blind Transport Format Detection is optional both in the UE and the UTRAN. Therefore, for all CCTrCH a TFCI shall be transmitted, including the possibilty of a TFCI length zero, if only one TFC is defined.

~~Blind transport format detection may be performed in the receiver by trying all possible combinations of the transport format.~~

4.2.13.2 Explicit transport format detection based on TFCI

4.2.13.2.1 Transport Format Combination Indicator (TFCI)

The Transport Format Combination Indicator (TFCI) informs the receiver of the transport format combination of the CCTrCHs . As soon as the TFCI is detected, the transport format combination, and hence the individual transport channels' transport formats are known, and decoding of the transport channels can be performed.