Agenda Item:	AH 99
Source:	Ericsson
Title:	Correction of BTFD limitations
Document for:	Approval

Introduction

Blind transport format detection is mandatory in the UE given certain limitations. One limitation is that CRC detection can always be used for separating different transport format combinations. One item not reflected in the specification is that it must also be detected whether a block error has occurred or a transport format combination, without any data on that certain transport channel, is transmitted. If no CRC is appended when no data is transmitted there is no possibility to separate these cases by CRC detection. Therefore power measurements are required on that specific transport channel. This should be the only case when those rather complex power measurements are required for BTFD. Furthermore there are no performance requirements on that measurement.

Background

In 25.212, paragraph 4.3.1, it is stated that Blind transport format detection in the UE is only applicable when the following limitations are fulfilled.

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1. only one CCTrCH is received by the UE.

2. the number of CCTrCH bits received per radio frame is 600 or less;

3. the number of transport format combinations of the CCTrCH is 64 or less;

4. fixed positions of the transport channels is used on the CCTrCH to be detected;

5. convolutional coding is used on all explicitly detected TrCHs;

6. CRC is appended to all transport blocks on all explicitly detected TrCHs;

7. the number of explicitly detected TrCHs is 3 or less;

8. for all explicitly detected TrCHs i, the number of code blocks in one TTI (C_i) shall not exceed 1;

9. the sum of the transport format set sizes of all explicitly detected TrCHs, is 16 or less. The transport format set size is defined as the number of transport formats within the transport format set;

10.   there is at least one TrCH that can be used as the guiding transport channel for all transport channels using guided detection.

From these limitations the conclusion is that blind transport format detection always can be performed by CRC detection.

In 25.212, paragraph 4.2.1.1, it is stated:

> *If no transport blocks are input to the CRC calculation ($M_i = 0$), no CRC attachment shall be done. If transport blocks are input to the CRC calculation ($M_i \neq 0$) and the size of a transport block is zero ($A_i = 0$), CRC shall be attached, i.e. all parity bits equal to zero.*

This paragraph states there are two options when no data is transmitted in a TTI. Either a transport block of length 0 is input to the CRC calculation, thereby a CRC is transmitted, or no transport block is input to the CRC calculation, then no CRC is transmitted in the TTI.

In case there is a TFC where no transport block is input to the CRC calculation there are no possibility to separate this TFC and a block error except by power detection on that transport channel.

Problems

When Blind Transport Format Detection is performed by the UE there is one combination that still is not fully specified. This case is when a TrCH for which the rate is explicitly detected, has one transport fomat with zero rate which is transmitted without an added CRC.

Then there is no good way of doing detection between no transport block being transmitted in that TTI and a block error.

When no good detection of a transport format of a transport block of length 0 can be performed the BLER measurement as well as the power control is affected. On a channel for which the BLER target is set and the BLER estimation does not work properly there is a risk that the power control will require more power than needed and thereby increase the interference level.

Proposal for specification

To avoid the problems discussed above one further limitiation should be included. A transport channel with explicitly detected rate shall every TTI have at least one CRC attached.

CHANGE REQUEST

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

25.212	**CR**	**094**	Current Version:	**3.4.0**	

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

For submission to: **RAN#10**

list expected approval meeting # here ?

for approval **X**
for information ☐

strategic ☐
non-strategic ☐

(for SMG use only)

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: (U)SIM ☐   ME **X**   UTRAN / Radio **X**   Core Network ☐
(at least one should be marked with an X)

Source:	Ericsson	**Date:**	2000-10-03

Subject: Correction of BTFD limitations

Work item:

Category: F   Correction   **X**   **Release:**

(only one category
Shall be marked
With an X)

F	Correction	**X**
A	Corresponds to a correction in an earlier release	☐
B	Addition of feature	☐
C	Functional modification of feature	☐
D	Editorial modification	☐

Release:	
Phase 2	☐
Release 96	☐
Release 97	☐
Release 98	☐
Release 99	**X**
Release 00	☐

Reason for change: For the BLER estimation it must always be possible to detect if a transport block has been transmitted or not. Now this is not always possible to detect by a CRC check.

Clauses affected: 4.3

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:

4.3 Transport format detection

If the transport format set of a TrCH i contains more than one transport format, the transport format can be detected according to one of the following methods:

- TFCI based detection: This method is applicable when the transport format combination is signalled using the TFCI field;
- explicit blind detection: This method typically consists of detecting the TF of TrCH i by use of channel decoding and CRC check;
- guided detection: This method is applicable when there is at least one other TrCH i', hereafter called guiding TrCH, such that:
  - the guiding TrCH has the same TTI duration as the TrCH under consideration, i.e. $F_{i'} = F_i$;
  - different TFs of the TrCH under consideration correspond to different TFs of the guiding TrCH;
  - explicit blind detection is used on the guiding TrCH.

If the transport format set for a TrCH i contains one transport format only, no transport format detection needs to be performed for this TrCH.

For uplink, blind transport format detection is a network controlled option. For downlink, the UE shall be capable of performing blind transport format detection, if certain restrictions on the configured transport channels are fulfilled. For a DPCH associated with a PDSCH, the DPCCH shall include TFCI.

4.3.1 Blind transport format detection

When no TFCI is available then explicit blind detection or guided detection shall be performed on all TrCHs within the CCTrCH that have more than one transport format. The UE shall only be required to support blind transport format detection if all of the following restrictions are fulfilled:

1. only one CCTrCH is received by the UE.
2. the number of CCTrCH bits received per radio frame is 600 or less;
3. the number of transport format combinations of the CCTrCH is 64 or less;
4. fixed positions of the transport channels is used on the CCTrCH to be detected;
5. convolutional coding is used on all explicitly detected TrCHs;
6. CRC is appended to all transport blocks on all explicitly detected TrCHs;
7. at least one CRC shall be transmitted per TTI on each explicitly detected TrCH;
78. the number of explicitly detected TrCHs is 3 or less;
89. for all explicitly detected TrCHs i, the number of code blocks in one TTI (C_i) shall not exceed 1;
910. the sum of the transport format set sizes of all explicitly detected TrCHs, is 16 or less. The transport format set size is defined as the number of transport formats within the transport format set;
1011. there is at least one TrCH that can be used as the guiding transport channel for all transport channels using guided detection.

Examples of blind transport format detection methods are given in annex A.

4.3.2 Transport format detection based on TFCI

If a TFCI is available, then TFCI based detection shall be applicable to all TrCHs within the CCTrCH. The TFCI informs the receiver about the transport format combination of the CCTrCHs. As soon as the TFCI is detected, the transport format combination, and hence the transport formats of the individual transport channels are known.