3GPP TSG RAN WG1 Meeting #17
21st-24th November 2000, Stockholm, Sweden

Document R1-00-1427
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.

25.212 CR 099 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: TSG-RAN #10	for approval	X	strategic		(for SMG
list expected approval meeting # here ?	for information		non-strategic		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: Mitsubishi Electric (Trium-RD) **Date:** 21/11/2000

Subject: Editorial modification in RM section.

Work item: AH99

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

F	Correction		**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	X		Release 99	X
				Release 00	

Reason for change:

?? In figure 2, bits w_1, w_2, …, w_R were numbered up to p,R. But index p on PhCH is inconsistent as physical channel segmentation is not yet done for these bits.
?? In section 4.2.7.2.2 and subsection thereof the multiply sign does not always follow the agreed notational conventions ?
?? In section 4.2.7.2.2.1, TFC l was replaced by TFC j in a comment to be in line with the notation for TFC index.

Clauses affected: 4.2, 4.2.7.2.2, 4.2.7.2.2.1, 4.2.7. 2.2.2, 4.2.7.2.2.3

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: None

help.doc

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4.2 Transport-channel coding/multiplexing

Data arrives to the coding/multiplexing unit in form of transport block sets once every transmission time interval. The transmission time interval is transport-channel specific from the set {10 ms, 20 ms, 40 ms, 80 ms}.

The following coding/multiplexing steps can be identified:

- add CRC to each transport block (see subclause 4.2.1);
- transport block concatenation and code block segmentation (see subclause 4.2.2);
- channel coding (see subclause 4.2.3);
- radio frame equalisation (see subclause 4.2.4);
- rate matching (see subclause 4.2.7);
- insertion of discontinuous transmission (DTX) indication bits (see subclause 4.2.9);
- interleaving (two steps, see subclauses 4.2.5 and 4.2.11);
- radio frame segmentation (see subclause 4.2.6);
- multiplexing of transport channels (see subclause 4.2.8);
- physical channel segmentation (see subclause 4.2.10);
- mapping to physical channels (see subclause 4.2.12).

The coding/multiplexing steps for uplink and downlink are shown in figure 1 and figure 2 respectively.

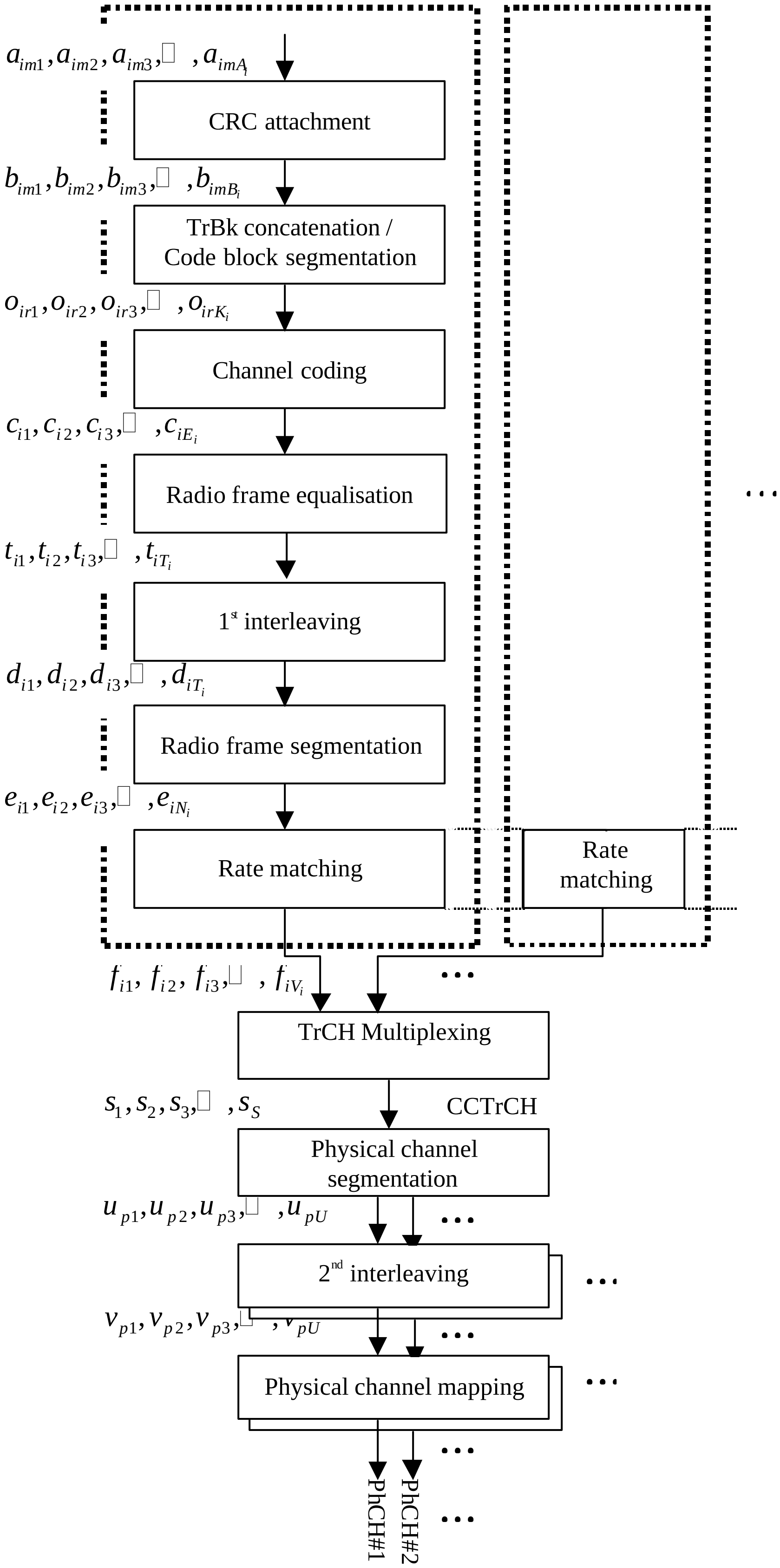
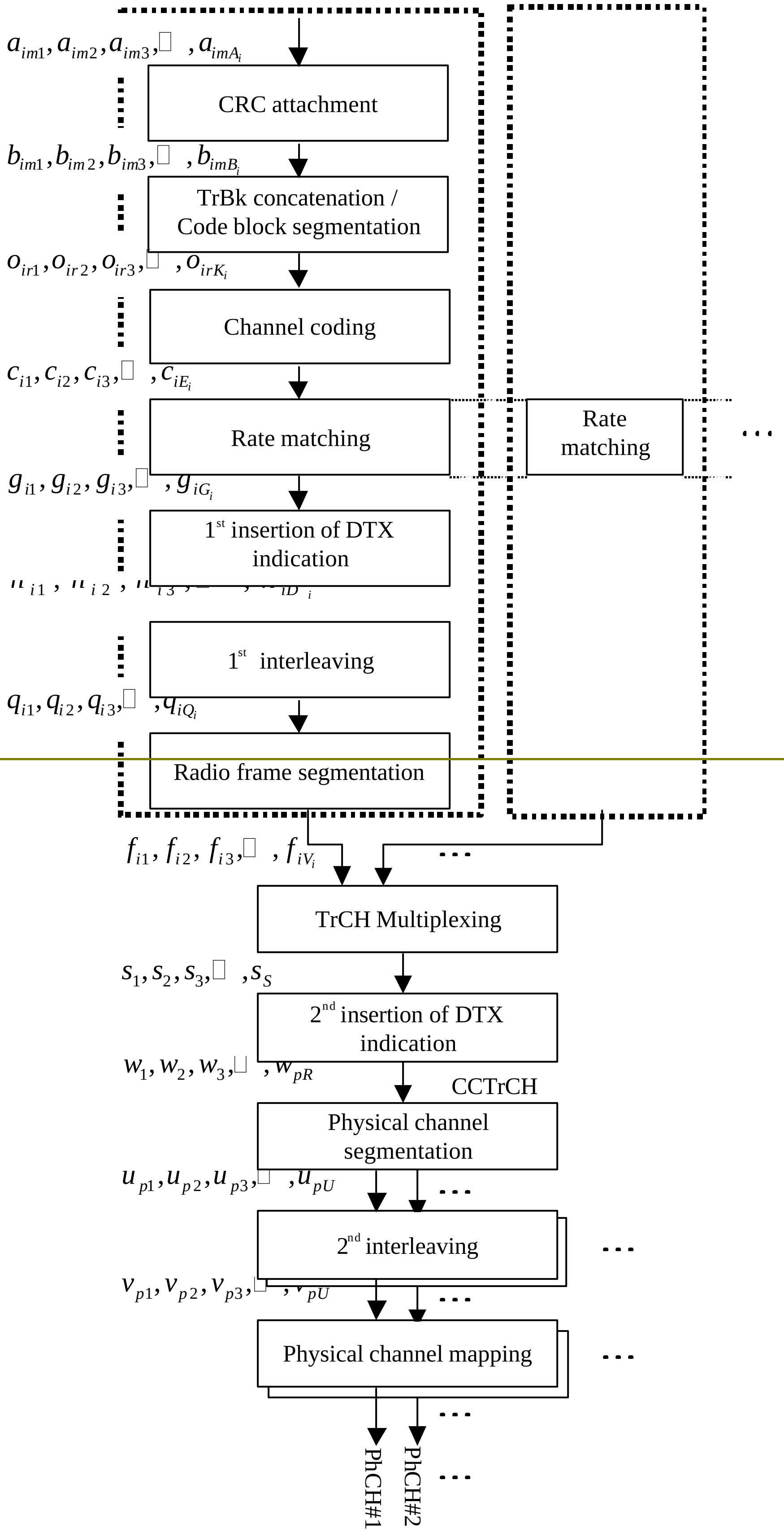


Figure 1: Transport channel multiplexing structure for uplink


CRC attachment
TrBk concatenation / Code block segmentation
Channel coding
Rate matching
Rate matching
1st insertion of DTX indication
1st interleaving
Radio frame segmentation
TrCH Multiplexing
2nd insertion of DTX indication
CCTrCH
Physical channel segmentation
2nd interleaving
Physical channel mapping
PhCH#1
PhCH#2

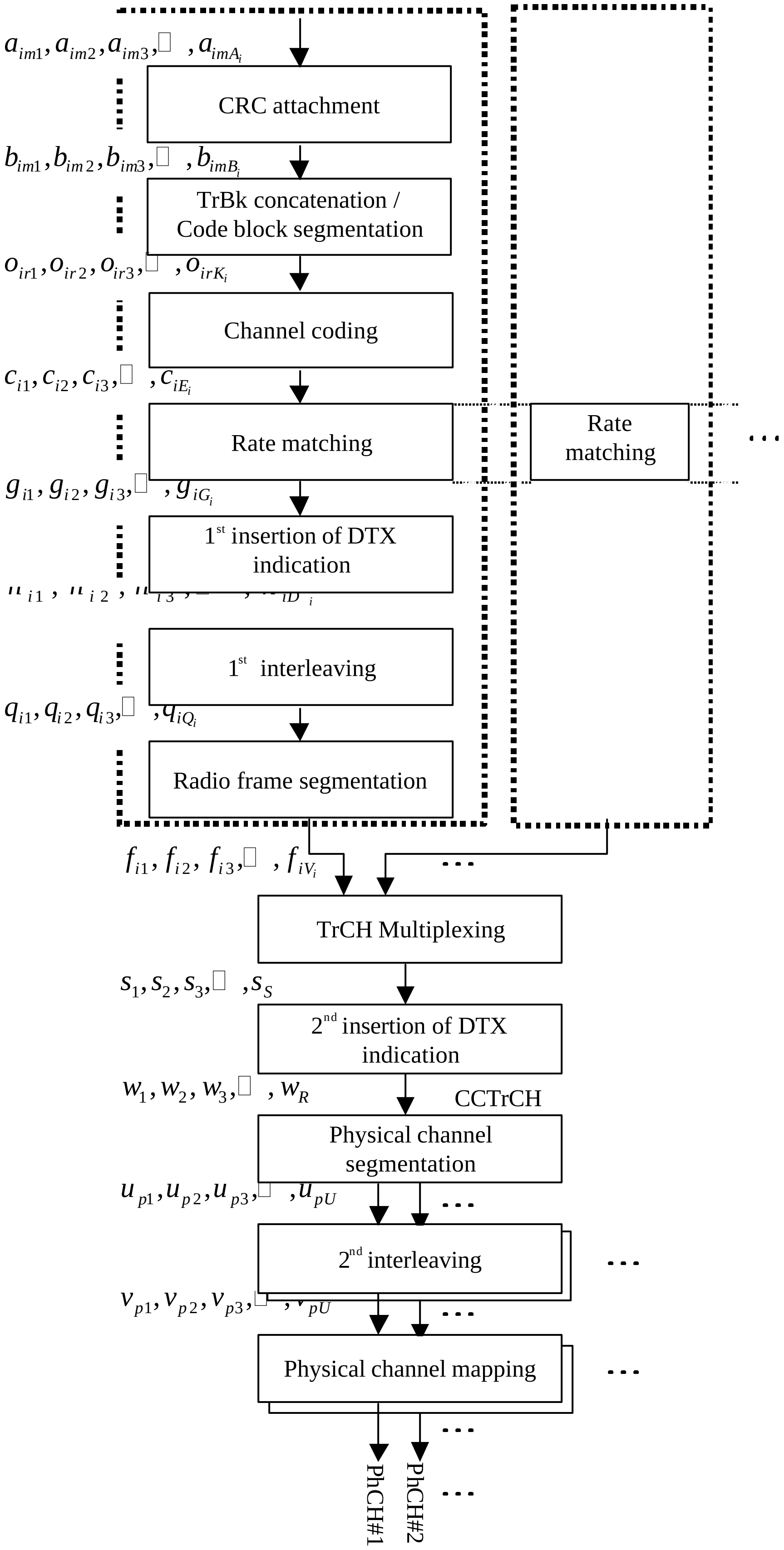


Figure 2: Transport channel multiplexing structure for downlink

The single output data stream from the TrCH multiplexing, including DTX indication bits in downlink, is denoted *Coded Composite Transport Channel (CCTrCH)*. A CCTrCH can be mapped to one or several physical channels.

4.2.7.2.2 Determination of rate matching parameters for flexible positions of TrCHs

4.2.7.2.2.1 Calculations for normal mode, compressed mode by higher layer scheduling, and compressed mode by spreading factor reduction

First an intermediate calculation variable N_{ij} is calculated for all transport channels *i* and all transport format combinations *j* by the following formula:

$$~~N_{i,j} ? \frac{1}{F_i} ? N^{TTI}_{i,TF_i?j?}~~ \quad N_{i,j} ? \frac{1}{F_i} ? N^{TTI}_{i,TF_i?j?}$$

Then rate matching ratios RF_i are calculated for each the transport channel *i* in order to minimise the number of DTX bits when the bit rate of the CCTrCH is maximum. The RF_i ratios are defined by the following formula:

$$~~RF_i ? \frac{N_{data,*}}{\max\limits_{j?TFCS} \sum\limits_{i?1}^{i?I} ?RM_i ? N_{i,j}?} ? RM_i~~ \quad RF_i ? \frac{N_{data,*}}{\max\limits_{j?TFCS} \sum\limits_{i?1}^{i?I} ?RM_i ? N_{i,j}?} ? RM_i$$

The computation of $?N^{TTI}_{i,l}$ parameters is then performed in two phases. In a first phase, tentative temporary values of $?N^{TTI}_{i,l}$ are computed, and in the second phase they are checked and corrected. The first phase, by use of the RF_i ratios, ensures that the number of DTX indication bits inserted is minimum when the CCTrCH bit rate is maximum, but it does not ensure that the maximum CCTrCH b it rate is not greater than $N_{data,*}$. per 10ms. The latter condition is ensured through the checking and possible corrections carried out in the second phase.

At the end of the second phase, the latest value of $?N^{TTI}_{i,l}$ is the definitive value.

The first phase defines the tentative temporary $?N^{TTI}_{i,l}$ for all transport channel *i* and any of its transport format *l* by use of the following formula:

$$~~?N^{TTI}_{i,l} ? F_i ? ?\frac{RF_i ? N^{TTI}_{i,l}}{F_i} ? ? N^{TTI}_{i,l} ? F_i ? ?\frac{N_{data,*} ? RM_i ? N^{TTI}_{i,l}}{F_i ? \max\limits_{j?TFCS} \sum\limits_{i?1}^{I} ?RM_i ? N_{i,j}?} ? ? N^{TTI}_{i,l}~~$$

$$?N^{TTI}_{i,l} ? F_i ? ?\frac{RF_i ? N^{TTI}_{i,l}}{F_i} ? ? N^{TTI}_{i,l} ? F_i ? ?\frac{N_{data,*} ? RM_i ? N^{TTI}_{i,l}}{F_i ? \max\limits_{j?TFCS} \sum\limits_{i?1}^{I} ?RM_i ? N_{i,j}?} ? ? N^{TTI}_{i,l}$$

The second phase is defined by the following algorithm:

for all j in *TFCS* in ascending order of TFCI do -- for all TFC

$$D ? \sum_{i?1}^{i?I} \frac{N^{TTI}_{i,TF_i?j?} ? ?N^{TTI}_{i,TF_i?j?}}{F_i}$$ -- CCTrCH bit rate (bits per 10ms) for TFC *j* ~~*l*~~

if $D ? N_{data,*}$ then

for *i* = 1 to *I* do -- for all TrCH

$~~?N ? F_i ?? N_{i,j}~~$ $?N ? F_i ? ?N_{i,j}$ -- $?N_{i,j}$ is derived from $N_{i,j}$ by the formula given at subclause 4.2.7.

if $?N_{i,TF_i?j?}^{TTI} ? ?N$ then

$?N_{i,TF_i?j?}^{TTI} ? ?N$

end-if

end-for

end-if

end-for

If $?N_{i,l}^{TTI} ? 0$ then, for TrCH *i* at TF *l*, the output data of the rate matching is the same as the input data and the rate matching algorithm of subclause 4.2.7.5 does not need to be executed.

If $?N_{i,l}^{TTI} ? 0$ the parameters listed in subclauses 4.2.7.2.2.2 and 4.2.7.2.2.3 shall be used for determining e_{ini}, e_{plus}, and e_{minus}.

4.2.7.2.2.2 Determination of rate matching parameters for uncoded and convolutionally encoded TrCHs

$?N_i ? ?N_{il}^{TTI}$

a=2

For each transmission time interval of TrCH *i* with TF *l*, the rate-matching pattern is calculated with the algorithm in subclause 4.2.7.5. The following parameters are used as input:

$X_i ? N_{il}^{TTI}$

$e_{ini} ? 1$

~~$e_{plus} ? a ?N_{il}^{TTI}$~~ $e_{plus} ? a ? N_{il}^{TTI}$

~~$e_{minus} ? a ?|?N_i|$~~ $e_{minus} ? a ? |?N_i|$

puncturing for $?N_i ? 0$, repetition otherwise.

4.2.7.2.2.3 Determination of rate matching parameters for Turbo encoded TrCHs

If repetition is to be performed on turbo encoded TrCHs, i.e. $?N_{il}^{TTI} ? 0$, the parameters in subclause 4.2.7.2.2.2 are used.

If puncturing is to be performed, the parameters below shall be used. Index *b* is used to indicate systematic (*b*=1), 1st parity (*b*=2), and 2nd parity bit (*b*=3).

a=2 when *b*=2

a=1 when *b*=3

The bits indicated by *b*=1 shall not be punctured.

$$?N_i ? \begin{cases} ??N_{il}^{TTI}/2?, & b ? 2 \\ ??N_{il}^{TTI}/2?, & b ? 3 \end{cases}$$

For each transmission time interval of TrCH *i* with TF *l*, the rate-matching pattern is calculated with the algorithm in subclause 4.2.7.5. The following parameters are used as input:

$X_i \ ? \ N_{il}^{TTI} / 3$,

$e_{ini} \ ? \ X_i$,

~~$e_{plus} \ ? \ a ? X_i$~~ $e_{plus} \ ? \ a ? \ X_i$

~~$e_{\min us} \ ? \ a ? |? N_i|$~~ $e_{\min us} \ ? \ a ? |? N_i|$