TSG-RAN Working Group 1 meeting #10
Beijing, China
January 18th – 21st, 2000

TSGR1#10(00)0085

Agenda item: AH 04 + AH 08

Source: Nokia

Title: CR 25.212-033rev1: Physical channel mapping and UE capabilities

Document for: Decision

At the present, section 4.2.12, Physical channel mapping, in TS 25.212, defines that no bits are mapped to TGL consecutive slots in compressed mode. If SF/2 method is used with TGL=7, it means that 7 slot gap is created in the physical channel mapping section. The data, however, reserves only 7.5 slots when going to spreading factor SF/2. And for this reason, additional 0.5 slot of DTX has to be inserted in 2nd DTX insertion block.

This means that if TGL=7 , and SF/2 method is used with single frame method, the number of bits in the CCTrCH is not the same in normal mode and compressed mode. It is 0.5 slot bigger in compressed mode. Increasing the number of CCTrCH bits in compressed mode is of course not avoidable, if SF/2 method is used with TGL < 7. But quite likely the case with TGL=7 per single frame is the most relevant, when defining the UE capability parameters.

At the moment there are following parameters defined in TR 25.926, UE radio access capabilities:

Downlink: Maximum number of DPCH bits received per 10 ms

Uplink: Maximum number of DPDCH bits transmitted per 10 ms

It has not been discussed whether these parameters should define the capability also in compressed mode , when SF/2 method is used. If that is so, then perhaps, the parameter name should be changed to :

Downlink: Maximum number of CCTrCH bits received per 10 ms

Uplink: Maximum number of CCTrCH bits transmitted per 10 ms

These parameters could be used so that the same parameter defines the UE capability in normal mode, and in compressed mode with SF/2 method with TGL=7 in single frame method.

However, a decision has to be made, whether the parameter value should be selected

a) based on worst case: SF/2 method with TGL=7 with single frame method, so that additional 0.5 slot number of bits is included to the parameter value => number of CCTrCH bits in normal mode + 0.5 slot of bits due to SF/2 method.

b) based on the assumption that the # of CCTrCH bits value is the same in normal mode and in SF/2 method with TGL=7 per single frame. In this case the specification has to be modified so that additional 0.5 slot of DTX is created in the physical channel mapping section, and not inserted in 2nd DTX insertion.

The benefit of b) is also that every time SF/2 method is used with TGL=7 with single frame method, it is only physical channel mapping section, that needs to be reconfigured. With the present method, all 4 blocks has to be reconfigured in that case: 2nd insertion, physical channel segmentation, 2nd interleaving, physical channel mapping.

It should be taken into account, that there can be several compressed mode patterns running simultaneously. If the number of reconfiguring steps for multiplexing algorithms can be minimised in compressed mode, it simplifies the overall usage of several compressed mode patterns at the same time.

The attached CR proposes to add 0.5 slot of DTX in physical channel mapping always with SF/2 method. Thus it is added for all TGL lengths, not only for TGL=7, to simplify the definition.

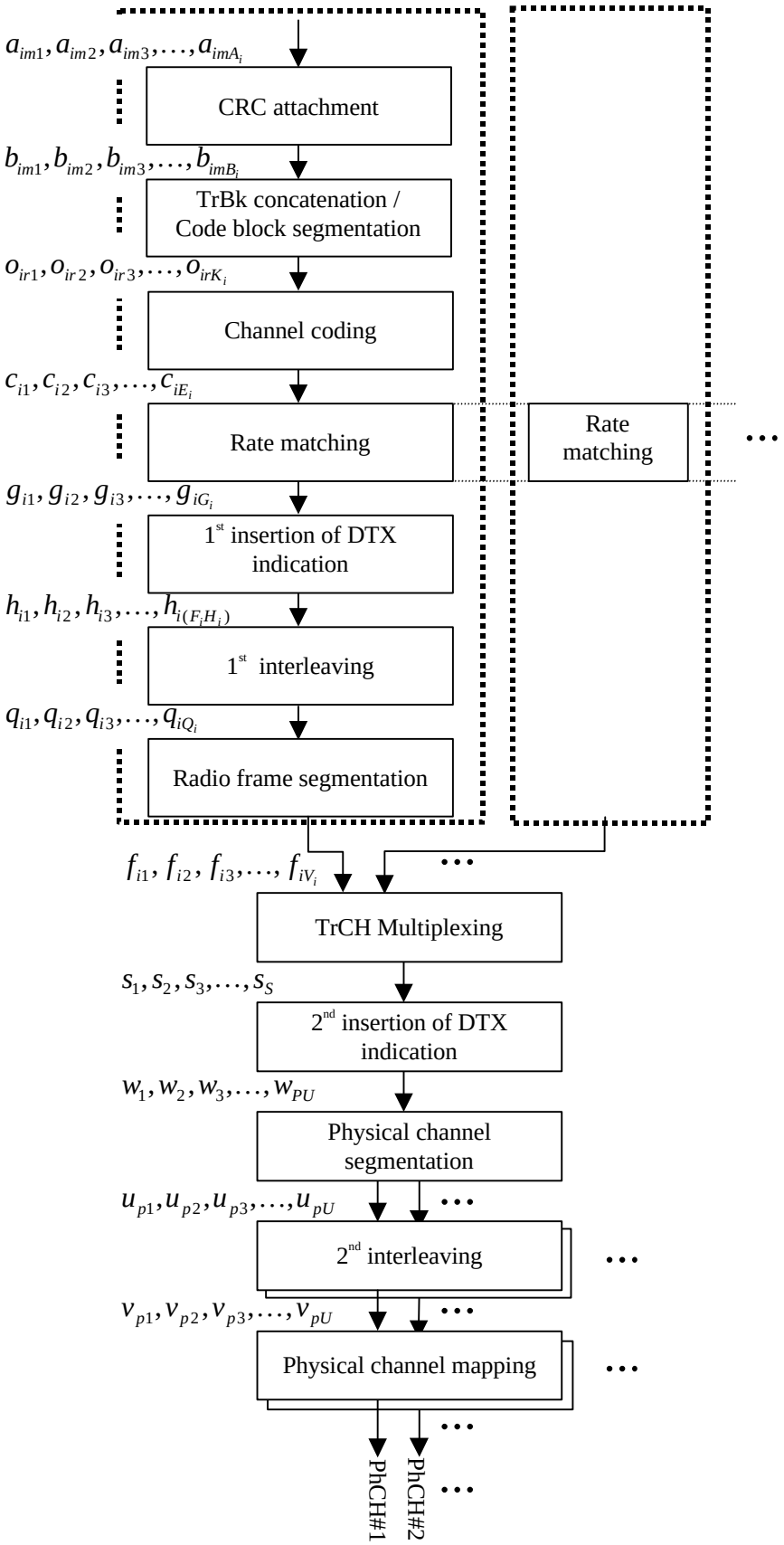

Figure 2: Transport channel multiplexing structure for downlink

3GPP TSG RAN WG1 Meeting #10
Beijing, China, Jan 18 – 21, 2000

Document R1-00-0085
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	033rev1	Current Version:	3.1.0

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	X	UTRAN / Radio	X	Core Network	

Source: Nokia **Date:** 1999-01-07

Subject: Physical channel mapping and insertion of DTX bits

Work item:

Category: *(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:

Since the TR 25.926, UE Radio access capabilities, now contain a capability parameter, how many DPCH bits (actually it should be changed to number of CCTrCH bits) is the UE capable of receiving per 10 ms, it is beneficial that the number of these bits is the same in normal mode and in compressed mode with SF/2 method, when TGL=7 in single frame method. Otherwise the capability is either unclear in compressed mode, or increasing the UE capability requirements.

At the moment the number of CCTrCH bits is increased by 0.5 slot number of bits when going to SF/2, since 0.5 slot of DTX is inserted in 2nd insertion of DTX . In this CR the corresponding sections: 4.2.7.1.2, 4.2.9.2 and 4.2.12 are changed so that the number of CCTrCH bits remains the same in SF/2 method with TGL=7 per single frame as in normal mode, since here it is defined that the 0.5 slot of DTX is created in physical channel mapping section.

Clauses affected:

4.2.7.1.2 Determination of parameters needed for calculating the rate matching pattern
4.2.9.2 2nd insertion of DTX indication bits
4.2.12 Physical channel mapping

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.

4.2.7.1.2 Determination of parameters needed for calculating the rate matching pattern

The number of bits to be repeated or punctured, DN_{ij}, within one radio frame for each TrCH i is calculated with equation 1 for all possible transport format combinations j and selected every radio frame. $N_{data,j}$ is given from section 4.2.7.1.1. In compressed mode $N_{data,j}$ is replaced by $N^{cm}_{data,j}$ in Equation 1. $N^{cm}_{data,j}$ is given from the following relation:

~~$N^{cm}_{data,j} = 2N_{data,j} - 2N_{TGL}$~~ $N^{cm}_{data,j} = \frac{2 \cdot (15 - 0.5)}{15} N_{data,j} - 2N_{TGL}$, for compressed mode by spreading factor reduction

$N^{cm}_{data,j} = N_{data,j} - N_{TGL}$, for compressed mode by higher layer scheduling

$$N_{TGL} = \begin{cases} \frac{TGL}{15} N_{data,j}, \text{ if } N_{first} + TGL \le 15 \\ \frac{15 - N_{first}}{15} N_{data,j}, \text{ in first frame if } N_{first} + TGL > 15 \\ \frac{TGL - (15 - N_{first})}{15} N_{data,j}, \text{ in second frame if } N_{first} + TGL > 15 \end{cases}$$

N_{first} and TGL are defined in section 4.4.

If $DN_{ij} = 0$ then the output data of the rate matching is the same as the input data and the rate matching algorithm of section 4.2.7.5 does not need to be executed.

If $DN_{ij} \neq 0$ the parameters listed in sections 4.2.7.1.2.1 and 4.2.7.1.2.2 shall be used for determining e_{ini}, e_{plus}, and e_{minus} (regardless if the radio frame is compressed or not).

4.2.9.2 2nd insertion of DTX indication bits

The DTX indication bits inserted in this step shall be placed at the end of the radio frame. Note that the DTX will be distributed over all slots after 2nd interleaving.

The bits input to the DTX insertion block are denoted by $s_1, s_2, s_3, \ldots, s_S$,where S is the number of bits from TrCH multiplexing. The number of PhCHs is denoted by P and the number of bits in one radio frame, including DTX indication bits, for each PhCH by U. The number of available bits on the PhCH is denoted by N_{data} and $N_{data}=15N_{data1}+15N_{data2}$, where N_{data1} and N_{data2} are defined in [25.211]. In normal mode $U=N_{data}$. In compressed mode N_{data} is changed from the value in normal node. The exact value of N_{data} is dependent on the TGL and the transmission time reduction method, which are signalled from higher layers. The number of bits that are located within the transmission gap is denoted N_{TGL} and defined as:

$$N_{TGL} = \begin{cases} \frac{TGL}{15} N_{data}, \text{ if } N_{first} + TGL \le 15 \\ \frac{15 - N_{first}}{15} N_{data}, \text{ in first frame if } N_{first} + TGL > 15 \\ \frac{TGL - (15 - N_{first})}{15} N_{data}, \text{ in second frame if } N_{first} + TGL > 15 \end{cases}$$

N_{first} and TGL are defined in Section 4.4.

For ~~In~~ compressed mode with spreading factor reduction:

$$U = \frac{15 - 0.5}{15} N_{data} - N_{TGL}$$

For compressed mode with other methods: $U=N_{data}-N_{TGL}$.

~~$U=N_{data}-N_{TGL}$.~~

The bits output from the DTX insertion block are denoted by $w_1, w_2, w_3, \ldots, w_{(PU)}$. Note that these bits are threevalued. They are defined by the following relations:

$w_k = s_k$ k = 1, 2, 3, …, S

$w_k = d$ k = S+1, S+2, S+3, …, PU

where DTX indication bits are denoted by d. Here $s_k \in \{0,1\}$and $d \notin \{0,1\}$.

4.2.12 Physical channel mapping

The PhCH for both uplink and downlink is defined in [2]. The bits input to the physical channel mapping are denoted by $v_{p1}, v_{p2}, \ldots, v_{pU}$, where p is the PhCH number and U is the number of bits in one radio frame for one PhCH. The bits v_{pk} are mapped to the PhCHs so that the bits for each PhCH are transmitted over the air in ascending order with respect to k.

In compressed mode, no bits are mapped to certain slots of the PhCH(s). If $N_{first} + TGL \leq 15$, no bits are mapped to slots N_{first} to N_{last}. If $N_{first} + TGL > 15$, i.e. the transmission gap spans two consecutive radio frames, the mapping is as follows:

- In the first radio frame, no bits are mapped to slots N_{first}, $N_{first}+1$, $N_{first}+2$, …, 14.
- In the second radio frame, no bits are mapped to the slots 0, 1, 2, …, N_{last}.

TGL, N_{first}, and N_{last} are defined in section 4.4.

In addition to this, with compressed mode by reducing the spreading factor by 2, no bits are mapped to the half time slot next to the transmission gap defined as follows:

If $N_{first} + TGL \leq 15$, i.e. the transmission gap spans one radio frame,

- if $N_{last} < 14$, no bits are mapped to first $(N_{Data1} + N_{Data2})/2$ bit positions in slot $N_{last}+1$.
- if $N_{last} = 14$, no bits are mapped to last $(N_{Data1} + N_{Data2})/2$ bit positions in slot $N_{first}-1$.

If $N_{first} + TGL > 15$, i.e. the transmission gap spans two consecutive radio frames,

- In the first radio frame, no bits are mapped to last $(N_{Data1} + N_{Data2})/2$ bit positions in slot $N_{first}-1$.
- In the second radio frame, no bits are mapped to first $(N_{Data1} + N_{Data2})/2$ bit positions in slot $N_{last}+1$.

N_{Data1} and N_{Data2} are defined in [2].

4.2.12.1 Uplink

In uplink, the PhCHs used during a radio frame are either completely filled with bits that are transmitted over the air or not used at all. The only exception is when the UE is in compressed mode. The transmission can then be turned off during consecutive slots of the radio frame.

4.2.12.2 Downlink

In downlink, the PhCHs do not need to be completely filled with bits that are transmitted over the air. Bits $v_{pk} \notin \{0, 1\}$ are not transmitted.

The following rules should be used for the selection of fixed or flexible positions of the TrCHs in the radio frame:

- For TrCHs not relying on TFCI for transport format detection (blind transport format detection), the positions of the transport channels within the radio frame should be fixed. In a limited number of cases, where there are a small number of transport format combinations, it is possible to allow flexible positions.
- For TrCHs relying on TFCI for transport format detection, higher layer signal whether the positions of the transport channels should be fixed or flexible.