3GPP TSG RAN #26 **Tdoc RP-040527**

Athens, Greece,

8th - 10th December 2004

Agenda Item:	**8.2.1.3**
Source:	**Nokia, Philips, Siemens**
Title:	**Technically Endorsed RAN1 CRs on Preamble and Postamble to Reduce HS-DPCCH transmit power**
Document for:	**Approval**

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1 Introduction

3GPP TSG RAN WG1 meeting #39 technically endorsed the attached CRs [1,2] but due to concerns raised (see WI report) the WG1 could not agree on the inclusion of the feature to the 3GPP specifications. The WG1 agreed to raise the issue in TSG RAN.

2 Attachments

[1] R1-041314 25.212CR195 (Rel-6, B)"Preamble and Postamble to reduce HS-DPCCH transmit power"

[2] R1-041490 25.214CR358 r1(Rel-6, B)"Preamble and Postamble to reduce HS-DPCCH transmit power"

3GPP TSG-RAN WG1 Meeting #39
Shin-Yokohama, Japan, 15th – 19th November 2004

Tdoc ⌘R1-041314

CR-Form-v7.1

CHANGE REQUEST

⌘ **TS25.212 CR 195** ⌘**rev -** ⌘ Current version: **6.2.0** ⌘

*For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.*

Proposed change affects: | UICC apps⌘ ☐ ME [X] Radio Access Network [X] Core Network ☐

Title:	⌘	Preamble and Postamble to reduce HS-DPCCH transmit power
Source:	⌘	Philips, Nokia
Work item code:	⌘	RANimp-RABSE-ACKNACK
Date:	⌘	01/11/2004
Category:	⌘	B
Release:	⌘	Rel-6

Use one of the following categories:
F *(correction)*
A *(corresponds to a correction in an earlier release)*
B *(addition of feature),*
C *(functional modification of feature)*
D *(editorial modification)*
Detailed explanations of the above categories can be found in 3GPP TR 21.900.

Use one of the following releases:
Ph2 (GSM Phase 2)
R96 (Release 1996)
R97 (Release 1997)
R98 (Release 1998)
R99 (Release 1999)
Rel-4 (Release 4)
Rel-5 (Release 5)
Rel-6 (Release 6)
Rel-7 (Release 7)

Reason for change:	⌘	The transmission of a layer 1 preamble and postamble on the HS-DPCCH can improve ACK/NACK decoding reliability, enabling a lower HS-DPCCH transmit power to be used, resulting in improved coverage for DCH or E-DCH.
Summary of change:	⌘	Channel coding is defined for preamble and postamble.
Consequences if not approved:	⌘	Reduced HS-DPCCH transmit power and improved coverage for DCH or E-DCH would not be achieved.

Clauses affected:	⌘	4.7.1.1

Other specs affected:	⌘	Y	N		⌘
		X		Other core specifications	25.214, 25.331, 25.423, 25.433
				Test specifications	
				O&M Specifications	

Other comments:	⌘	

How to create CRs using this form:
Comprehensive information and tips about how to create CRs can be found at http://www.3gpp.org/specs/CR.htm.
Below is a brief summary:

1) Fill out the above form. The symbols above marked ⌘ contain pop-up help information about the field that they are closest to.
2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be

downloaded from the 3GPP server under ftp://ftp.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2001-03 contains the specifications resulting from the March 2001 TSG meetings.

3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

4.7 Coding for HS-DPCCH

Data arrives to the coding unit in form of indicators for measurement indication and HARQ acknowledgement.

The following coding/multiplexing steps can be identified:

- channel coding (see subclause 4.7.1);
- mapping to physical channels (see subclause 4.7.2).

The general coding flow is shown in the figure below. This is done in parallel for the HARQ-ACK and CQI as the flows are not directly multiplexed but are transmitted at different times.

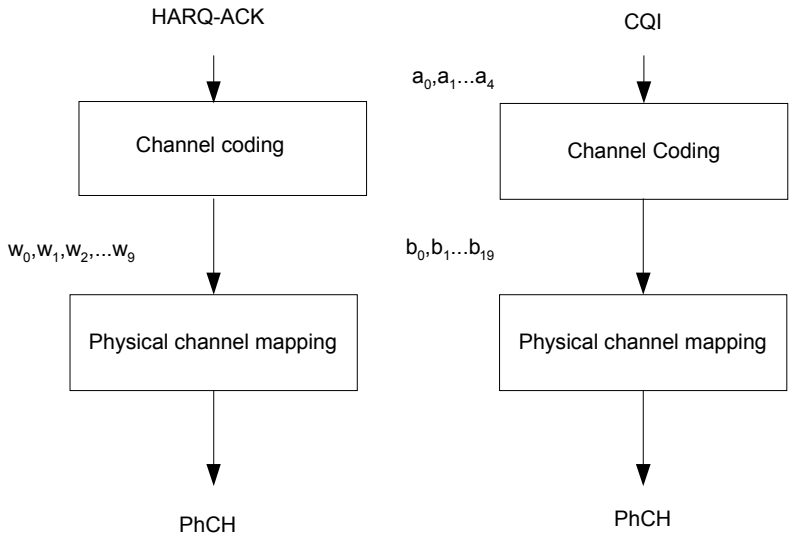

Figure 20: Coding for HS-DPCCH

4.7.1 Channel coding for HS-DPCCH

Two forms of channel coding are used, one for the channel quality information (CQI) and another for HARQ-ACK (acknowledgement).

4.7.1.1 Channel coding for HS-DPCCH HARQ-ACK

The HARQ acknowledgement message to be transmitted, as defined in [4], shall be coded to 10 bits as shown in Table 13A. The output is denoted w_0, w_1,…w_9.

Table 13A: Channel coding of HARQ-ACK

HARQ-ACK message to be transmitted	w_0	w_1	w_2	w_3	w_4	w_5	w_6	w_7	w_8	w_9
ACK	1	1	1	1	1	1	1	1	1	1
NACK	0	0	0	0	0	0	0	0	0	0
PRE	0	0	1	0	0	1	0	0	1	0
POST	0	1	0	0	1	0	0	1	0	0

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Shin-Yokohama, Japan, 15th – 19th November 2004

Tdoc ⌘R1-041490

CR-Form-v7.1

CHANGE REQUEST

⌘ **TS25.214** **CR** **358** ⌘ **rev** **1** ⌘ Current version: **6.3.0** ⌘

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Proposed change affects: | UICC apps⌘ ☐ ME [X] Radio Access Network [X] Core Network ☐

Title:	⌘	Preamble and Postamble to reduce HS-DPCCH transmit power
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Use one of the following releases:
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Rel-6 (Release 6)
Rel-7 (Release 7)

Reason for change:	⌘	The transmission of a layer 1 preamble and postamble on the HS-DPCCH can improve ACK/NACK decoding reliability, enabling a lower HS-DPCCH transmit power to be used, resulting in improved coverage for DCH or E-DCH.
Summary of change:	⌘	The procedure for transmitting HS-DPCCH preamble and postamble is defined.
Consequences if not approved:	⌘	Reduced HS-DPCCH transmit power and improved coverage for DCH or E-DCH would not be achieved.

Clauses affected:	⌘	5.1.2.5A, 6A.1, 6A.1.1. 6A.3

Other specs affected:	⌘	Y	N		⌘	
		X		Other core specifications	⌘	25.212, 25.331, 25.423, 25.433
				Test specifications		
				O&M Specifications		

Other comments:	⌘	

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5.1.2.5A Setting of the uplink DPCCH/HS-DPCCH power difference

When an HS-DPCCH is active, the power offset $\Delta_{HS\text{-}DPCCH}$ for each HS-DPCCH slot shall be set as follows.

For HS-DPCCH slots carrying HARQ Acknowledgement :

$\Delta_{HS\text{-}DPCCH} = \Delta_{ACK}$ if the corresponding HARQ-ACK message ~~Acknowledgement~~ is ACK~~equal to 1~~

$\Delta_{HS\text{-}DPCCH} = \Delta_{NACK}$ if the corresponding HARQ-ACK message ~~Acknowledgement~~ is NACK~~equal to 0~~

$\Delta_{HS\text{-}DPCCH}$ is the greatest of Δ_{ACK} and Δ_{NACK} if the corresponding HARQ-ACK message is PRE or POST.

For HS-DPCCH slots carrying CQI :

$\Delta_{HS\text{-}DPCCH} = \Delta_{CQI}$

The values for Δ_{ACK}, Δ_{NACK} and Δ_{CQI} are set by higher layers.

Then, in non-compressed frames β_{hs}, which is the gain factor defined in [3] subclause 4.2.1, is calculated according to

$$\beta_{hs} = \beta_c \cdot 10^{\left(\frac{\Delta_{HS-DPCCH}}{20}\right)},$$

where β_c value is signalled by higher-layer or calculated as described in subclause 5.1.2.5.2 or 5.1.2.5.3.

With the exception of the start and end of compressed frames, any DPCCH power change shall not modify the power ratio between the DPCCH and the HS-DPCCH. The power ratio between the DPCCH and the HS-DPCCH during compressed DPCCH frames is described below.

During the period between the start and end of a compressed DPCCH frame, when HS-DPCCH is transmitted, β_{hs} is calculated according to

$$\beta_{hs} = \beta_{c,C,j} \cdot 10^{\left(\frac{\Delta_{HS-DPCCH}}{20}\right)} \cdot \sqrt{\frac{N_{pilot,C}}{N_{pilot,N}}},$$

where $\beta_{c,C,j}$ is calculated as described in subclause 5.1.2.5.4, $N_{pilot,C}$ is the number of pilot bits per slot on the DPCCH in compressed frames, and $N_{pilot,N}$ is the number of pilot bits per slot in non-compressed frames.

Thus the gain factor β_{hs} varies depending on the current power offset $\Delta_{HS\text{-}DPCCH}$ and on whether the UL DPCCH is currently in a compressed frame.

6A HS-DSCH-related procedures

6A .1 General procedure

Scheduling and transport format selection is controlled by the MAC-hs sublayer in the Node B [9].

The following physical layer parameters are signalled to the UE and the Node B from higher layers:

1) HS-SCCH set to be monitored
2) Repetition factor of ACK/NACK: N_acknack_transmit
3) Channel Quality Indicator (CQI) feedback cycle *k*.
4) Repetition factor of CQI: N_cqi_transmit
5) Measurement power offset Γ
6) Status of preamble/postamble transmission: HARQ_preamble_mode

6A .1.1 UE procedure for receiving HS-DSCH

In this sub-clause, sub-frame *n* on the HS-SCCHs refers to the sub-frame which is associated with sub-frame *n* on the HS-PDSCH as defined in [1], and sub-frame *n* on the HS-DPCCH refers to the sub-frame which is related to sub-frame *n* on the HS-PDSCH as defined in [1].

If the UE did not detect consistent control information intended for this UE on any of the HS-SCCHs in the HS-SCCH set in the immediately preceding subframe *n* – 1, the UE shall in sub-frame *n* monitor all HS-SCCHs in the HS-SCCH set. The maximum size of the HS-SCCH set is 4.

If the UE did detect consistent control information intended for this UE in the immediately preceding subframe *n* – 1, it is sufficient in sub-frame *n* to only monitor the same HS-SCCH used in the immediately preceding subframe *n* – 1.

When the UE monitors HS-SCCHs, the UE shall only consider the control information to be consistent

if decoded 'channelization-code-set information' is lower than or equal to 'maximum number of HS-DSCH codes received' in its UE capability and

if the decoded modulation scheme is valid in terms of its UE capability.

If a UE detects that one of the monitored HS-SCCHs in sub-frame *n* carries consistent control information intended for this UE, the UE shall start receiving the HS-PDSCHs indicated by this control information~~.~~, and, if HARQ_preamble_mode = 1, the UE shall:

transmit a HARQ Preamble (PRE) in the slot allocated to HARQ-ACK in HS-DPCCH sub-frame *n* – 1, unless an ACK or NACK is to be transmitted in sub-frame *n* – 1 as a result of an HS-DSCH transmission earlier than sub-frame *n* on the HS-PDSCH, and

if N_acknack_transmit > 1, the UE shall transmit a HARQ Preamble in the slot allocated to HARQ-ACK in HS-DPCCH sub-frame *n* – 2, unless an ACK or NACK is to be transmitted in sub-frame *n* – 2 as a result of an HS-DSCH transmission earlier than sub-frame *n* on the HS-PDSCH.

The transport block size information shall be derived from the signaled TFRI value as defined in [9]. If the 'Hybrid-ARQ process information' is not included in the set configured by upper layers, the UE shall discard the information received on this HS-SCCH and on the HS-PDSCHs.

The UE shall transmit the ACK/NACK information received from MAC-hs in the slot allocated to the HARQ-ACK in the corresponding HS-DPCCH sub-frame as defined in [1]. When *N_ acknack_transmit* is greater than one, the UE shall:

repeat the transmission of the ACK/NACK information over the next (*N_ acknack_transmit-1*) consecutive HS-DPCCH sub-frames, in the slots allocated to the HARQ-ACK as defined in [1] and

not attempt to receive nor decode transport blocks from the HS-PDSCH in HS-DSCH sub-frames corresponding to HS-DPCCH sub-frames in which the ACK/NACK information transmission is repeated.

If ACK or NACK is transmitted in HS-DPCCH sub-frame *n*, and HARQ_preamble_mode = 1 and UE InterTTI ≤ *N_acknack_transmit*, then the UE shall:

transmit a HARQ Postamble (POST) in the slot allocated to HARQ-ACK in HS-DPCCH subframe $n + 2*N\_acknack\_transmt - 1$, unless ACK, NACK, or PRE is to be transmitted in this subframe, and

if *N_acknack_transmit* > 1, transmit a HARQ Postamble (POST) in the slot allocated to HARQ-ACK in HS-DPCCH subframe $n + 2*N\_acknack\_transmit - 2$, unless an ACK, NACK or PRE is to be transmitted in this subframe.

If consistent control information is not detected on any of the HS-SCCHs in the HS-SCCH set, ~~neither ACK, nor NACK,~~DTX shall be ~~transmitted~~ used on the HS-DPCCH in the corresponding HS-DPCCH subframe unless PRE or POST are transmitted as described above.

6A .3 Operation during compressed mode on the associated DPCH

During compressed mode on the associated DPCH, the following applies for the UE for transmission of HS-DPCCH and reception of HS-SCCH and HS-PDSCH:

- The UE shall neglect a HS-SCCH or HS-PDSCH transmission, if a part of the HS-SCCH or a part of the corresponding HS-PDSCH overlaps with a downlink transmission gap on the associated DPCH. In this case, neither ACK, nor NACK shall be transmitted by the UE to respond to the corresponding downlink transmission.

- If a part of a HS-DPCCH slot allocated ~~for ACK/NACK information~~to HARQ-ACK overlaps with an uplink transmission gap on the associated DPCH, the UE shall ~~not transmit ACK/NACK information~~use DTX on the HS-DPCCH in that HS-DPCCH slot.

- If in a HS-DPCCH sub-frame a part of the slots allocated for CQI information overlaps with an uplink transmission gap on the associated DPCH, the UE shall not transmit CQI information in that sub-frame.

- If a CQI report is scheduled in the current CQI field according to subclause 6A.1.2 paragraph (2), and the corresponding 3-slot reference period (as defined in subclause 6A.2) wholly or partly overlaps a downlink transmission gap, then the UE shall use DTX in the current CQI field and in the CQI fields in the next ($N\_cqi\_transmit$–1) subframes.