3GPP TSG RAN Meeting #18 RP-020850
New Orleans, Louisiana, USA, 3 - 6 December, 2002

Title: CRs (Rel-5) on HS-DPCCH Operation in SHO

Source: TSG-RAN WG1

Agenda item: 7.1.6

Release 5 CRs

CRs with links to other RAN WG1 specifications

TS 25.212 and TS 25.214

CRs on "HS-DPCCH Operaion in SHO" (RP-020850)

No.	Spec	CR	Rev	R1 T-doc	Subject	Phase	Cat	Workitem	V_old	V_new
1	25.212	161	1	R1-02-1422	Correction of coding of HARQ-ACK	REL-5	F	HSDPA-Phys	5.2.0	5.3.0
2	25.214	295	2	R1-02-1422	Correction of DTX transmission in ACK/NACK field	REL-5	F	HSDPA-Phys	5.2.0	5.3.0

Endorsed as technically correct by WG1. To be presented by the proposing companies to RAN with three options.

- Do nothing
- Include the CR provided
- Include the CR provided + investigate additional method for the cases when requirements are not necessary met

3GPP TSG-RAN WG1 Meeting #29 **R1-02-1422**
Shanghai, China, 5th – 8th November 2002

CR-Form-v7

CHANGE REQUEST

⌘ **25.212** **CR** **161** ⌘ **rev** **1** ⌘ Current version: **5.2.0** ⌘

*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:	⌘	Correction of coding of HARQ-ACK
Source:	⌘	TSG RAN WG1
Work item code:	⌘	HSDPA-Phys
Date:	⌘	07/11/2002
Category:	⌘	**F**
Release:	⌘	Rel-5

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:
2 (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)

Reason for change:	⌘	The mapping between higher-layer HARQ acknowledgements and physical layer signals is not defined. Also the physical layer coding of the HARQ preambles and postambles needs to be defined in order to meet the HS-DPCCH error requirements.
Summary of change:	⌘	A table is inserted describing the mapping of HARQ-ACK messages to physcial layer coding.
Consequences if not approved:	⌘	

Clauses affected:	⌘	4.7

Other specs Affected:	⌘	Y	N		⌘
		X		Other core specifications	TS25.214
			X	Test specifications	
			X	O&M Specifications	

Other comments:	⌘	If this CR is accepted, it should supercede CR 25.212-164, which contains some of the same changes.

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.

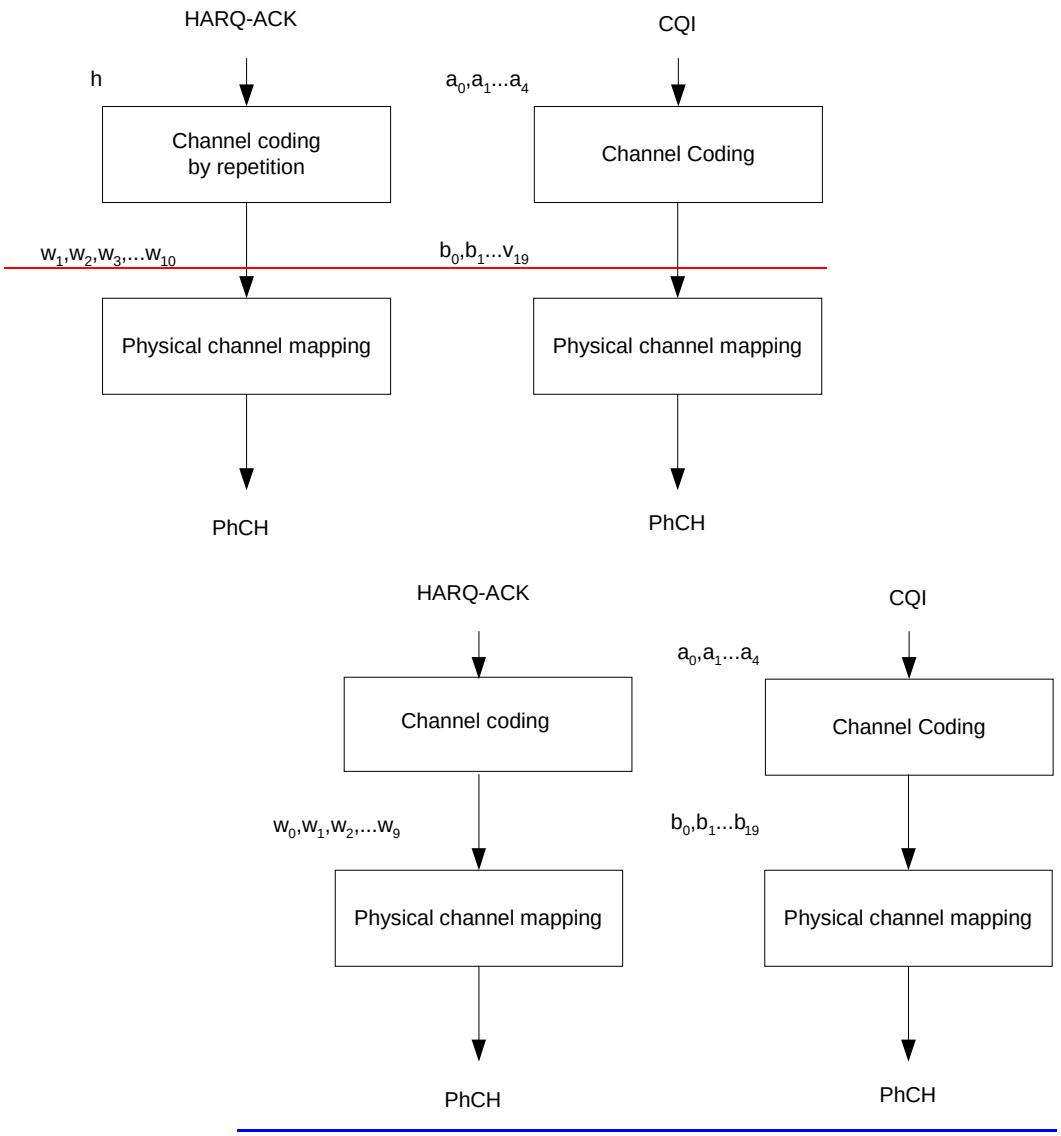

Figure 20: Coding for HS-DPCCH

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 ~~1 bit~~ HARQ acknowledgement message to be transmitted, as defined in [4], shall be ~~repetition~~ coded to 10 bits as shown in Table 13A. The output is denoted $w_{~~1~~0}$, $w_{1~~2~~}$,…$w_{~~10~~9}$.

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
Preamble	0	0	1	0	0	1	0	0	1	0
Postamble	0	1	0	0	1	0	0	1	0	0

3GPP TSG-RAN WG1 Meeting #29
Shanghai, China, 5th – 8th November 2002

R1-02-1422

CR-Form-v7

CHANGE REQUEST

⌘ **25.214** **CR** **295** ⌘ **rev** **2** ⌘ Current version: **5.2.0** ⌘

*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:	⌘	Correction of DTX transmission in ACK/NACK field
Source:	⌘	TSG RAN WG1
Work item code:	⌘	HSDPA-Phys
Date:	⌘	07/11/2002
Category:	⌘	**F**
Release:	⌘	Rel-5

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R97	*(Release 1997)*
R98	*(Release 1998)*
R99	*(Release 1999)*
Rel-4	*(Release 4)*
Rel-5	*(Release 5)*
Rel-6	*(Release 6)*

Reason for change:	⌘	The performance requirements for the Hybrid ARQ ACK/NACK signalling cannot be met satisfactorily.
Summary of change:	⌘	When the UE receives signalling information directed to it on the HS-SCCH, the UE transmits a preamble in the sub-frame before the one allocated to the hybrid ARQ ACK/NACK. In addition, if the UE's InterTTI is less than or equal to N_acknack_transmit, it transmits a postamble in the sub-frame following the hybrid ARQ ACK/NACK. This avoids the Node B having to detect DTX as NACK in the hybrid ARQ ACK/NACK sub-frame, giving a substantial reduction in the required ACK power.
Consequences if not approved:	⌘	

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

Other specs affected: ⌘	Y	N		
	X		Other core specifications	⌘ TS25.212
		X	Test specifications	
		X	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 relative power offset $\Delta_{HS\text{-}DPCCH}$ between the DPCCH and the HS-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 is ACK ~~Acknowledgement is equal to 1~~

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

The setting of the power difference between DPCCH and HS-DPCCH is independent of the inner loop power control.

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 5.1.2.5.3 or 5.1.2.5.4.

When HS-DPCCH is transmitted in compressed frames, β_{HS} is calculated according to

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

where $N_{pilot,C}$ 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.

The gain factor β_{HS} may vary on slot basis depending on the current power offset $\Delta_{HS\text{-}DPCCH}$ and whether the compressed mode is used or not in UL DPCH. When the HS-DPCCH and the DPCCH are not slot aligned, the reference DPCCH power shall be the one used in the DPCCH slot being transmitted at the beginning i.e. slot boundary of the HS-DPCCH slot.

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: DTX_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 control information intended for this UE on any of the HS-SCCHs in the HS-SCCH set in the ~~previous~~ subframe *n* – 1, the UE shall monitor all HS-SCCHs in the HS-SCCH set in sub-frame *n*. If the UE did detect control information intended for this UE in ~~the previous~~ subframe *n* – 1, it is sufficient in sub-frame *n* to only monitor the same HS-SCCH used in ~~the previous~~ subframe *n* – 1.

If a UE detects that one of the monitored HS-SCCHs in sub-frame *n* carries control information intended for this UE, the UE shall start receiving the HS-PDSCHs indicated by this control information, and, if DTX_mode = 1, the UE shall transmit a HARQ Preamble (PRE) in the slot allocated to HARQ-ACK in HS-DPCCH sub-frame *n* – 1. In addition, if N_acknack_transmit > 1 and DTX_mode = 1, the UE shall transmit a HARQ Preamble in the slot allocated to HARQ-ACK in HS-DPCCH sub-frame *n* – 2. However, these HARQ Preambles in sub-frames *n* – 2 and *n* – 1 shall not be transmitted if an ACK or NACK is to be transmitted in the respective sub-frames as a result of an HS-DSCH transmission earlier than sub-frame *n* on the HS-PDSCH.

After decoding the HS-PDSCH data, the UE shall transmit an hybrid ARQ ACK or NACK as determined by the MAC-hs based on the CRC check. The UE shall repeat the transmission of the ACK/NACK information over *N_acknack_transmit* consecutive HS-DPCCH sub-frames, in the slots allocated to the HARQ-ACK as defined in [1]. When *N_ acknack_transmit* is greater than one, the UE shall not attempt to receive nor decode transport blocks from the HS-PDSCH in HS-DSCH sub-frames *n + 1* to *n + (N_acknack _transmit - 1)* ~~where *n* is the number of the last HS-DSCH sub-frame in which a transport block has been received~~.

If DTX_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_transmit* – 1, unless an 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.

Apart from the above provisions, ~~I~~if 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 in the corresponding subframe.

6A .1.2 UE procedure for reporting channel quality indication (CQI)