TSG RAN Meeting #18   **RP-020822**
New Orleans, USA, 3rd – 6th December 2002

Title	**Correction of HARQ-ACK in 25.212 and 25.214 (without higher layer signalling)**
Source	**Philips, Nokia**
Agenda Item	**7.1.5**

RAN1 Tdoc	Spec	curr. Vers.	new Vers.	REL	CR	Rev	Cat	Title	Work item
Company proposal	25.212	5.2.0	5.3.0	REL-5	161	1	F	Correction of coding of HARQ-ACK	HSDPA-Phys
Company proposal	25.214	5.2.0	5.3.0	REL-5	295	3	F	Correction of DTX transmission in ACK/NACK field	HSDPA-Phys

These CR's are provided as a Company Proposal, as a possible alternative to RP-020850. The CR's are identical to those provided in RP-020850 except that the higher layer parameter DTX_mode has been removed from CR 25.214-295 as suggested by discussion in RAN WG2.

CR-Form-v7

CHANGE REQUEST

⌘ **25.214** CR **295** ⌘**rev** **3** ⌘ 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: ⌘	Philips, Nokia	
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 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

	Y	N		
Other specs affected: ⌘	X		Other core specifications ⌘	TS25.212
		X	Test specifications	
		X	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.

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

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

For HS-DPCCH slots carrying HARQ Acknowledgement :

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

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

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

For HS-DPCCH slots carrying CQI :

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

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

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 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, 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 UE InterTTI $\leq N\_acknack\_transmit$, 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, Iif 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)