TSG-RAN WG1#7
Hanover, Germany,
30 August - 3 September 1999

TSGR1#7(99)B63

Agenda Item: Adhoc 14(report from E-mail discussion)

Source: **SAMSUNG Electronics Co.**

Title: **Discussion on gated transmission of DPCCH**

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1. Introduction
This document summaries the discussions ont the Ad hoc 14 E-mail reflector regarding text proposal of gated transmission of DPCCH – Tdoc A37and A77. Several companies raised questions and comments about the Tdoc A37. This report includes questions and answers for clarification.

2. Discussions on the E-mail reflector
2.1
Date: Mon, 2 Aug 1999 12:41:38 +0100
From: Tim Moulsley <moulsley@PRL.RESEARCH.PHILIPS.COM>
Organization: Philips Research Laboratories
Subject: AH14: Comments on Tdoc A37 (DPCCH gating etc)

I support the general approach for discontinous control channels in Tdoc A37. However, some parts of the proposed text for 25.214 could be further clarified before the next WG1 meeting.

Therefore I offer the folowing comments/questions:

• *The new title of section 7 reflects only gated transmission. Perhaps a slightly different structure is needed, for example:*
7. Discontinuous Transmission
7.1 General
7.2 Gated transmission in DCH/DCH Control Only Substate, etc
7.3 Rapid initialization of DCH, etc
[SAMSUNG]
Fortunately, we have almost the same structure with your suggestion in our new document.
I think the revised text proposal R1-99a77 is in line with this comment.

· Is TFCI transmission needed on the downlink in gated mode with no DPDCH transmission?
[SAMSUNG]
We do not need to send TFCI on the downlink in gated mode when no DPDCH transmission because the recevier does not use these TFCI bits in this case. However, it is better keeping current scheme(i.e sending TFCI bits) to minimize the discontinuity which result in abrupt chages of RF power.
-> However, finally we considered not to send TFCI bits when there is no DPDCH data. Then, I think this can clear the cocern on the text.

• *In 7.4 extending the set of diagrams to cover all the possible cases may be helpful. The first example presented is setting up a DSCH. Perhaps it would be more natural to first describe initialisation of DCH for uplink packet transmission. In considering initialisation of a DSCH, perhaps some more detail needs to given on how the UE would initiate a call using a DSCH. Would there also be activity on the uplink DPDCH (not shown in figure 5)?*
[SAMSUNG]
Motorola may answer this question.

• *Is it intended that the resumption of DCH (as shown in Figure 7) would be used in the case of DPCCH gating mode 0? If so, this should be clearly stated.*
[SAMSUNG]
I believe that NTT DoCoMo is preparing this and will answer.

2.2
Date: Wed, 11 Aug 1999 13:17:47 +0200
From: Fredrik Ovesjo <Fredrik.Ovesjo@ERA-T.ERICSSON.SE>
Organization: Ericsson Radio Systems AB
Subject: Re: AH14: Comments on Tdoc A37 (DPCCH gating etc)

I agree that the text proposal could be clarified somewhat.

- *In addition to Tim's comments, I think that the term "power control group" should be replaced with "slot". Power control group is not used anywhere else in our documentation. Moreover, some "reverse links" have creeped into the text, those should be "uplink".*
[SAMSUNG]
I already corrected "power control" to "slot" in the latest text proposal R1-99a77. Therefore, Power control group is not used anywhere else in our documentation. Moreover, some "reverse links" have creeped into the Motorola text, those should be "uplink".

In the R1-99a77, there were two pharagraphs which use "reverse link"

- section 7.2.1 : In order to initialise fast reverse link power control loop, searcher and channel estimator at the Node B, the UE will adhere to the following:
- section 7.2.1 : The transmission of "reverse" link DPCCH will start at Nslots slots(1 to 15) prior to the scheduled downlink packet data transmission using DSCH

-> Mr. Nakamura-san will send the revised text proposal of Tdoc A77 to the reflector soon.

· *Is some information about how to enter/leave the gating mode needed in WG1 documentation, or is that handled completely by WG2 documentation?*
[SAMSUNG]
Since the gating is initiated/terminated by RRC primitives, no more description is required at WG1 document.

· *Finally, if we can avoid talking about substates in WG1 documentation that is preferable.*
[SAMSUNG]
Gated transmission is operated only in the control only substate.
We recommend that the word about this substate be kept in WG1 document
to prevent misunderstanding.

· *I also have a few questions on the DPCCH gating for my understanding (they may have been addressed already in ad hoc 14, in that case I apologise for the repetition):*

· *That the pilot is transmitted in another slot than the other DPCCH fields, is that to make sure that the pilot is received first of the fields? It would be simpler to just send all DPCCH fields in the same slot, but maybe that gives worse performance.*
[SAMSUNG]
As you understand, that is for the performance.
In order to have better performance, we want to keep current structure.

· *What is DPCCH gating during DPDCH transmission?*
[SAMSUNG-a]
When there is transmission on the DPDCH, the DPCCH shall be gated on(i.e shall have no gating) for the duration of the active DPDCH frame, as given in table 3, 4 and figure 7,8 in Tdoc R1-99a77.

· *What data is transmitted on the DPDCH in DCH/DCH control only substate?*
[SAMSUNG]
Control messages are transmited in control only substate, e.g
- control message for link maintenance, handover, etc.

· *What is the gain by gating the DPCCH when there is DPDCH transmission? I thought the gating mode was only done when there was no data to transmit. Could someone elaborate please?*

[SAMSUNG]
Your thought is right. see above comment [SAMSUNG-a].

2.3
Date: Thu, 12 Aug 1999 13:29:00 +0200
From: Fredrik Ovesjo <Fredrik.Ovesjo@ERA-T.ERICSSON.SE>
Organization: Ericsson Radio Systems AB
Subject: Re: Re) AH14, comments on A37

There is still some thing I do not understand, please see comments below.

"PARK, Changsoo" wrote:
> > - What is DPCCH gating during DPDCH transmission?
> [SAMSUNG-a]
> When there is transmission on the DPDCH, the DPCCH shall be gated on(i.e
> shall have no gating) for the duration of the active DPDCH frame,
> as given in table 3, 4 and figure 7,8 in Tdoc R1-99a77.

- *But in table 3 and 4 you gate the TPC in DL and FBI+TPC in uplink, right? Hence, the DPCCH is not fully on when you transmit the DPDCH.*

> > What is the gain by gating the DPCCH when there is DPDCH transmission?
> > I thought the gating mode was only done when there was no data to transmit.
> [SAMSUNG]
> Your thought is right. see above comment [SAMSUNG-a].

· *It seems that there is some misunderstanding. Shall the entire DPCCH*
always be transmitted when the DPDCH is transmitted or not?
[SAMSUNG]
I understand your confusion.
Generally, power control rate is reduced in gating mode.
Receiver cannot change power control rate in real time even when there is a DPDCH transmission.
That's why we draw figures like those in Tdoc A77. The performance results were reviewed in the adhoc 14.
However, we will change figures to transmit all commands if people want it. However, it is recommended not to try change power control rate during gating mode in the COS.
I hope this assist you to understand.

2.4
Date: Fri, 13 Aug 1999 14:45:39 +0200
From: Fredrik Ovesjo <Fredrik.Ovesjo@ERA-T.ERICSSON.SE>
Organization: Ericsson Radio Systems AB
Subject: Re: Re) AH14, comments on A37

· *Suppose you do not have any data to transmit and is gating 1/3 of*
pilot, TFCI, and TPC. Suddenly data appears, and then you transmit the
data on the DPDCH, transmit all pilot and TFCI bits, and only 1/3 of
the TPC commands. This is what you propose, right?
[SAMSUNG]
Yes, your are correct.

· *Then, why can we assume that during that data burst we only need lower*
rate on the power control? Has this been evaluated by simulations? If
it is ok to have only some of the TPC commands in gated mode during
DPDCH transmission, then we could do the same reduction for normal
non-gated transmission, right?
[SAMSUNG]
Yes, there is a certain performance degradation during DPDCH due to reduced rate of power control rate.
This simulation is one of the basic simulation we did in the previous documents,

· *Maybe this has be addressed by ad hoc 14: Why can't you change TPC*
rate in real time during gating mode in COS? I see no obvious
problems, but I haven't thought much about it. What was the resoning
for that assumption?

[SAMSUNG]
For the transmitter side, it is obvious to know a timing of DPDCH transmission, but for the receiver side, it is not obvious to know when to resume power control rate. So, it is safe to keep the current power control rate because of this asymmetric nature of transmiter and receiver.

Finally, a new question (sorry): what are the TFCI fields used for in
gated mode? Should I understand it so that at gating rate 1/3, it
takes 30 ms to receive one TFCI word to be decoded? That would mean
that DPDCH can be switched on only every 30 ms, which fits very badly
with our assumption that all interleaving periods of transport
channels are aligned. For example, a 40 ms interleaved frame could
only start at time 0, 40, 80, 120 etc. Allowing starts of interleaving
periods at other times would affect the assumptions in other WGs as
well I guess.
[SAMSUNG]
This is one of the area we discussed in the last meeting. I am afraid this is going to be a long explanation, so I recommend you to review our previous document regarding TFCI. Let me give you brief description.
When there is a DPDCH, TFCI is not gated.
When there is no DPDCH, TFCI is not needed.
To do that, we need kind of DPDCH DTX detection method in 10ms interval. Therefore, TFCI is transmmited in 10ms interval at all time. Unlike power control, message decoding is done in 10ms interval.

2.5
Date: Mon, 16 Aug 1999 10:17:40 +0200
From: Fredrik Ovesjo <Fredrik.Ovesjo@ERA-T.ERICSSON.SE>
Organization: Ericsson Radio Systems AB
Subject: Re: Re) AH14, comments on A37

I now understand that the TFCI bits have no real TFCI-meaning when
there is no DPDCH data to transmit. However, I do not understand what
those bits represent. Are they all set to "1" or can they have random
values? Is there any reason for transmitting these dummy "TFCI"-bits
at all, or could they be removed? Is it to help the blind
DTX-detection scheme in some way?
There is some assumption on the contents of the TFCI field during
gating with no DPDCH present, that should be covered by the text
proposal I think.
[SAMSUNG]
I'm very happy to see you finally get answers.
And, we will try to incorporate your comments until next meeting.

We are considering not to send TFCI bits when there is no DPDCH data.
Then, I think this can clear the cocern on the text.

One of the way to handle for dtx detection in the gating mode is energy detection.
We can measure the energy in gating-on slot and gating-off slot, and comparing those, we can know if there is DPDCH data or not. It turns out that this method works very well.
Of course, there is other way to do. I don't think we need specify in the text.

[Reference]
[1] 3GPP TSGR1#7(99)988, "Text proposal for DPCCH gating in COS (rev.871)", SAMSUNG.
[2] 3GPP TSGR1#7(99)A37, "Text proposal for section 7 in 25.214", Motorola, NTT DoCoMo, SAMSUNG
[3] 3GPP TSGR1#7(99)A77, "Text proposal for section 7 in 25.214(rev. Tdoc A37)", Motorola, NTT DoCoMo, SAMSUNG

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