TSG-RAN Working Group1 meeting#7bis TSGR1#7bis(99)f96
Kyongju, Korea , 4-5th October 1999
Agenda Item: Document for: Ad Hoc 14

Source: Co-Chair – Adhoc-14

AdHoc-14: Summary of Email Discussion

1 Summary

3 major topics were discussed on the email reflector, CPCH, DSCH and Gated Transmission in Control only substate. The following is a brief summary of the discussion and conclusions per topic.

- **CPCH: Five main topics were discussed.**
  - ***Text Proposals***
    - Comments on text of TS25.211 and TS25.214 were furnished by Mitsubishi, Nokia, Nortel and Philips.
    - Revised version of TS25.211 and TS25.214 based on the comments were submitted by GBT.
  - ***Alignment of CPCH with RACH***
    - CPCH should use the concept of RACH access sub-channel. Modified version of 25.214 with RACH sub-channel will be submitted.
  - ***CPCH Simulations***
    - Clarifications were sought by Philips on the assumptions used in Tdoc b77 by GBT on CPCH performance model. GBT answered their questions, the details of which can be found in the later section of this report. Panasonic also sought some clarifications on notations and various aspects of Tdoc b77. GBT explained the notations and the assumptions used in their document.
  - ***CPCH Power Control Preamble Part***
    - Nokia suggested to remove the power control preamble part in the CPCH procedure. GBT argued that the power control preamble will be useful for having an accurate power level for the message transmission part since the open loop estimate may be off due to fading rate. Philips will be submitting simulations to show the performance of CPCH with and without the use of preamble .
  - ***Usage of TFCI for CPCH***
    - Philips thought it is necessary to pre-define a limited set of TFs and TFCs for use in CPCH since the signaling load will be high if a large number of coding options is provided (based on liaison statement from Adhoc#4). GBT does not see the necessity for a limited set of TFCI. Nokia wondered why should TFCI be used to indicate change in data rate since CPCH packet length is known beforehand. GBT argued that the length of the packet is not known by UTRAN and TFCI will only be used to down the data rate.

- **DSCH**
  - Emails were exchanged between Ericsson, Panasonic and Nokia on clarifications regarding DSCH. Ericsson suggested to cleanup the text in the specification since the existing text on DSCH is rather confusing
  - Nokia submitted a revised text proposal on DSCH which reflects the changes based on the e-mail discussion.

- **Gated Transmission**

  - Ericsson performed EMC test on the uplink power gating at 300 and 500 Hz and submitted two sound files demonstrating the effect of gating as percieved through a common hearing aid apparatus. The results obtained show that interference from control channel DTX, at the maximum output power level 16 dBm, is detectable at distances 0.1 to 3 meters depending on the immunity of the tested electronic device. Based on the test's Ericsson recommends that uplink DPCCH gating should be removed from the specification. Mitsubishi submitted a proposal which uses time

hopping of the period of Gated transmission which they claim has less effect on hearing aid. The will be discussed in the Adhoc.

- **Tentative list of contributions to be discussed in the Adhoc:**

R1-99f04 Proposed text changes to 25.211 (CPCH Sections)

R1-99f05 Proposed text modifications to 25.214 to include sub RACH-Channel scheme to CPCH

R1-99f44 Idle Aich for CPCH (resubmitted R1-99b74)

R1-99f45 Firm Handover for CPCH (resubmitted R1-99b75)

R1-99f46 CPCH Simulations (resubmitted R1-99b77)

Procedures for CPCH

R1-99e82 Text changes to 25.214

R1-99e77 Proposal for code assignment in CPCH

R1-99e78 Proposal for CPCH status monitoring

(The following papers relate to the text proposals in e77, e78)

R1-99b13 Enhanced CPCH with Channel Assignment (Source Samsung, Philips)

R1-99b36 Performance of CPCH

R1-99b37 Enhanced CPCH with status monitoring and code assignment

R1-99b38 Status information for CPCH

Proposed clarifications to text on DSCH in 25.211/25.213 for WG1#7bis.

TSGR1#7(99)b54: The Secondary Collision Detection for CPCH

TSGR1#7(99)c60: The Timing of the Secondary Collision Detection for CPCH

R1-99b03: MAC Procedures for CPCH

R1-99b95: Support of MAC Procedures for CPCH in the

Physical Layer: R1-99b96: Questions & Answers of CCL/ITRI's MAC

Reducing EMC problem in uplink DPCCH Gated mode

2 Details of Discussion:

2.1 CPCH

Mitsubishi

I have some comment on the new spec. In section 4.6 I can read the following text :

Transmission of random access bursts on the PCPCH is aligned with access slot times. The timing of the access slots is derived from the receive

Primary CCPCH timing The transmit timing of access slot n starts n*10/N ms after the frame boundary of the received Primary CCPCH, where n = 0, 1, N-1, and N is the number of access slots per 10 ms.

So I have some problem to understand this. It seems that N is an integer because we consider access slots with number 0, 1 and N-1, on the other hand N is defined as the number of access slots per 10ms, so N = 7.5 ! Another point is do we consider only three possible slots 0, 1, and N-1, or do we consider all slots with numbers from 0 though N-1 ?

GBTs Response
This section is the same as 4.4 which is tilted PRACH synchronization. We probably have to update both sections to reflect 15 access slots in 20 ms. So we have the following suggestion for 4.6 PCPCH and 4.4 PRACH sections:

Transmission of random access bursts on the PCPCH is aligned with access slot times. The timing of the access slots is derived from the received Primary CCPCH timing The transmit timing of access slot n starts n*10/N ms after the frame boundary of the

Change formula to n*20/N

received Primary CCPCH, where n = 0, 1, N-1, and N is the

change n=0,1,...,N-1

number of access slots per 10 ms.

change per 20 ms.

Mitsubishi:
I am a bit confused by this text. Do we have cases when N is different from 15. If not, then why make the text complicate. Let us just write n = 0, 1, ..., 14, and change the formula to n * 20 / 15 ms. Also I support the opinion expressed by Frederik to have a cross reference to 25.211 instead. Generally speaking we should avoid duplication of information in several parts of the specs.

GBT' Response:
I agree with your latest comments. And also, we can make a reference to 7.3 and 7.4 of 25.211. These sections describe the timing relations-ship between the PRACH/AICH and PCPCH/AICH and as such clear the matters further. We are working to revise the text D71 to reflect these discussions as well as the RACH sub-channel scheme.

Text of discussion between Nortel, Philips and GBT (RACH and CPCH should be aligned):
Nortel:
I do remember that we had a discussion regarding the inclusion of the text proposed in R1-99d71. I would like however to check what we effectively decided in the plenary. I vigorously opposed the inclusion of the text since it does not allow any type of access slot segregetion and does not reuse the concept of RACH access sub-channel.That text was based on an old version of 25.214 and did not align with the outcome of the harmonisation. I cannot remember that we accepted this as a working assumption. I thought that nothing would go in the spec since we are going to rediscuss this at our next meeting. I would like therefore to ask our WG1 chairman and WG1 secretary to indicate which was effectively the outcome of the discussion. Whatever the answer is, I would like to indicate that the inclusion of the text is definitely not acceptable. I will send very soon a modified text proposal which allow a unified concept for the RACH and the CPCH. I will therefore challenge this Working assumption, if there is effectively such working assumption.

Philips:
I was not able to follow all the discussion but I would like to support the view expressed by Evelyne. It was my understanding from the debate in Ad-hoc 14, and subsequently, that CPCH access would be aligned with RACH access, which is not the case for the current text on CPCH in 25.214. It should also be noted that Tdoc d71 should strictly be sourced GBT rather than ad hoc 14, as it represents GBT's attempt to incorporate the comments made in the adhoc 14 session. At Hannover there was some understandable pressure to reach agreement on specification text for the next RAN meeting, and generally the meeting was very succesful in achieving this aim. However, this means that there are some areas where there may have been some confusion or lack of clarity, but which, with more time available, would have been resolved.
So, rather than spend effort debating the precise status of the current text on CPCH in 25.214, it may be more constructive to treat it only as a basis for further development at WG1#7bis. This seems particularly appropriate given the number of contributions remaining to be discussed on this topic.

Is this acceptable to GBT?

GBT's Response:
Regarding the D71 document, I would like to make a couple of comments. I document was presneted in the plenary and was approved by the group. there was no objection to it's approval during the plenary. However, during the approval of 25.214 document Nortel mentioned that the document does not include the RACH sub-channel scheme which had been agreed to in the AH14 discussions [which is true]. I think the decision was to approve the document with the sub-channel RACH revision. In other words, we have in principle agreed to the document, with the addition of the RACH sub-channel scheme. However, the modified text should be presented and agreed to by the group in the next WG1 meeting. So, I think the current scheme in D71+RACH sub-channel is agreed to in AH14 and plenary. We are alos preparing the modified version to include the RACH sub-channel scheme as well as the ASC for the signatures.

Text of discussion between Philips, Panasonic and GBT (On CPCH Simulations):

Philips:
I would like to try and duplicate the assumptions you used in Tdoc b77 in my own CPCH performance model. So I have a few questions now (and probably more later):-
When you give packet size (e.g 480 bytes) is that user data? If yes, then what channel coding is assumed? Do you include any other overheads (eg some Layer 2 signalling information)?
GBT> yes, we assume a factor of four overhead with signaling and everything included.
GBT> yes, the coding and signaling overhead is 1:4 for 64, 144 kbps and 1:3 for 384 kbps, 2Mbps.

What are the units of offered load and throughput? (Is it packets per frame?)
GBT> They are normalized in the graphs and tables. However, in the simulations, we measure them in bps and packets/ses. However, we are using the bps measurements and normalize them for the tables and graphs.
GBT> it is bps divided by total offered capacity.

What back-off parameters were assumed? Specifically what is the average back-off time?
GBT> an access slot [1,8] is randomly picked.

What was the maximum number of preamble retransmissions allowed?

GBT> 6

What was the average number of preamble retransmissions?
GBT> We did not meaure that, but we mesured the acess delay in ms and it i in the tables.

Philips:
You mention that the load and throughput are normalised, but what what are they normalised with respect to?

Do your packet overheads include a 10ms power control preamble?

I see that the largest packets you consider (2000bytes) could take a long time to deliver (i.e. up to 100 frames). In this case I would expect using a normal DCH pair in uplink/downlink to have some advantages (e.g. downlink channel available for acknowledgements).

You also mention one case with 32 CPCH's. This would not be supported by the current CPCH proposal, but perhaps you have some extension in mind?

Pansonic:

In general it is not clear to me what is shown in some of the tables, since some parameter are nor explained in the text and sometimes it is missing which parameter were changed in the tables.
Scenario A-B
What is D(e-e) ?
GBT: End-to end delay: Time between the creation of the packet and when it is destroyed.
What is gamma ?
GBT: Throughput
Is rho the load ? How did you define the load ?
GBT: offered load by all mobiles. We measure the offered load in the simulation.
What is each line showing ?
Scenario C_D_E
Sess ? Is it session length ?
GBT: Session inter-arrival time in seconds.
TD ?
GBT: Transmission Delay
D(un) ?
GBT: This is sum of Queueing delay, Access Delay and Transmission Delay. We will introduce a more useful delay, i.e, Waiting time in queue in the new paper.
How and when are retransmissions requested.
GBT: When there is an error, the base sends a NAK requesting re-transmission. RE-transmission is on a block by block basis. The UE has a MAX packet window [4] which is the maximum number of outstanding packets. After transmission of 4 packets, it stops sending the packets. There is also a timer, after the timer is expired, the UE re-transmits all of its outstanding packets. The simulation has RLC/SAR/MAC and PHY aspects incorporsted so it is a system level simulation.

Text of discussion between Nokia, Philips and GBT (On CPCH Scheme):
Nokia:
I would like to raise few items on the text on CPCH in 25.211.
1) There is still length for the power control preamble part given in square brackets and whole thing mentioned as ffs. I would like to have this sorted out so that we have either confirmation of the existence of the power control preamble or then we should remove that. I assume that only realistic lengths are either 10 ms or 0 ms (i.e. no power control

preamble at all). I feel that this is important item for the CPCH development itself as there are proposals for some additional uses of the power control preamble as well as some open items with issues like TFCI on that or not.

GBT:
Agreed. We could also have this similar to the rapid initialization scheme on dedicated channels. Which means that the length could be a multiple of the slots. n*slot length {1.333 ms}, where n varies from 0 to 14. Just a note that TFCI is not an open issue item.

Nokia:
Recalling from the discussions in the past, there issue has been what is the benefit of this preamble part as with the uplink side the power level should be close to correct value (after RACH procedure). Then the question is rather that is the 10 ms preamble in the uplink worth in comparison the downlink DPCH (carrying on control information) power saving. This is as one can have the same outcome by just starting without the preamble and then the downlink low rate channel power level can be reduced up to 15 dB during the first frame. Thus before hearing further arguments I would personally suggest removing the whole preamble. Comments?

GBT:
Bringing the power level to the right level is important both on uplink and downlink. After the last AP probe, there is [refer to Figure 26 of section 7.4 in 25.211] an overall 6/8 slots before the message transmission [6 x 1.33 = 7.98 ms when Tcpch =0, for Tcpch =1, this value is 8 * 1.33 = 10.64 ms]. Depending on the fading rate, the open loop estimate might be off significantly. For example, the following maximum errors exist in various fading rates:
1. fd =100 Hz, a full dip might happen in 5 ms, 30 dB dip.
2. fd = 10 Hz, a full dip might happen in 50 ms, 30 dB/50 ms, 6 dB in 10 ms
3. fd = 3 Hz, a full dip might occur in 115 ms, 30 dB/115 ms, 2.7 dB in 10 ms

Therefore inclusion of the pc preamble will be beneficial. Also, it is not a high price to pay in terms an additional 0-10 ms added delay. The gain is simply having an accurate power level for the message transmission which is more critical at higher rate, i.e, 384 kbps and low and high mobility environments. GBT still thinks that there is value in keeping this power control preamble as mentioned above, we can add flexibility by perhaps adopting the rapid intialization method for DCH and making the length multiple of 0-15 slots.

Nokia:
2) CPCH access preamble part
Text now says "The RACH preamble sequences could be used...." I think this should be said clearly "Shall be used", which has been the point in alignment with RACH. (And noting that the scrambling code can be different)

2) CPCH message part: The N_max_frames parameter might be useful to be identified to be higher layer parameter and not something set by physical layer.

GBT:
N_Max_Frames is a MAC parameter, decided by RNC to limit the UE capture time for each of the Common CPCH resources in the CPCH set assigned to a given cell.

Philips:
I agree that the CPCH power control preamble length needs to be defined. Ideally more data is needed on the performance. We may be able to produce some results for the WG1#7bis meeting. Another possibility is to harmonize with the procedure for Rapid initialization of DCH for uplink packet data transfer (section 7.2.2 in 25.214). I agree with the other suggestions you made on 2) and 3).

Nokia:
Regarding the CPCH power control preamble simulation, is your intention to compare the power "spent" at the uplink with respect the power "saved" in the downlink? (Between case of having 10 ms activity without data transmission or not?) In that case interesting assumptions are
a) what is the initial downlink power level with the preamble?
b) what is the initial downlink power level without the preamble?
Would they happen to be the same, there would be not that much to simulate then .... What is worth noting (and not visible from a link level simulation) is that such simulation often assumes case without pathloss present. Thus the only observed is Eb/(No+Io)..etc. Then in actual network it will be the case that some of the users will actually need the downlink DPCH at high power if their pathloss or interference situation from a neighbouring cell is very high and do not have any benefit from the 10 ms period. I feel that simulation data on this would be valuable, I just wanted to raise these issues to help making the conclusions from simulations produced.

Nokia:
I would like to raise few items on the text on CPCH in 25.213.

1) The RACH PAPR reduction method is not directly mentioned or referenced in CPCH text. And I suppose that is still used same way as RACH.

2) section 4.3.4.2 reads "CD preamble spreading code" while it should be "CD preamble scrambling code" for consistancy with previous chapters.

3) Access preamble scrambling code. This references to 4.3.3.2 which should apparantly be 4.3.3.1.

4) In the same section it is stated "The access preamble scrambling code generation is done in the same way as for the PRACH with a difference of the initialisation of the x m-sequence". Is this difference defined somewhere? Or is it obvious from the following sentence after the quoated one saying "The long code C(1,127) for the in-phase component is used directly on both ....."(I & Q) (Ad Hoc 10 participants could propably comment whether this is clear or not?)

CPCH Related changes to 25.211 (emails between Philips and GBT)

5.2.2.2 Physical Common Packet Channel
Are the DPCCH formats intended to be different for power control preamble and message part?
Pilot bit patterns are not defined for power control preamble or message part

Section 5.2.2.2.4 addresses the issue of DPCCH fields for the power control. Section 5.2.2.2.5 addresses the issue of DPCCH for the message part. We think we should use the SF of 512 as proposed by Philips in a separate e-mail for the DL-DPCCH. More specifically the first two rows of Table 10 in section 5.3.2 are appropriate for this purpose.

5.2.2.2.4 CPCH power control preamble part
Should FBI be supported in the power control preamble part? (Assuming it is to be used in the message part)

No. The text in section 5.2.2.2.4 references table 2 [row 2] of section 5.2.1.

5.2.2.2.5 CPCH message part
Message length is variable up to N_Max_frames. Therefore change sentence from: "Each message consists of N_max_ frames 10ms frames". to: "Each message consists of up to N_max_ frames 10ms frames".(editorial).

Agreed.

Is N_Max_frames fixed or variable? If fixed what is its value? If variable, how is N_Max_frames set?
N_MAX_FRAMES is decided by RNC and allocated separately to each CPCH channel in a CPCH SET. It is fixed from the UE's point of view, but RNC is free to dynamically change N_MAX_FRAMES to increase or decrease UE resource capture time for the CPCH shared resource.

How is the mapping of bit rates to signature sequences determined?
Bit rates are inherent in UL Channelization Code for each CPCH channel in a CPCH Set. CPCH resources are allocated to transport channels by RNC in sets of CPCH channels. UE MAC selects an appropriate CPCH channel from the set when the transport channel has UL data to send. The CPCH channels is a set are defined by the "CPCH SET INFO" information element which is part of the RRC SYSTEM INFORMATION MESSSAGE which is broadcast on the BCH. In the CPCH SET INFO, the signature set for all the CPCH channels are included in a block, e.g.:

LOC1: SIG 1
LOC2: SIG 2
LOC3: SIG 3
LOC4: SIG 4
LOC5: SIG 5
LOC6: SIG 6
LOC7: SIG 7
LOC8: SIG 8
If there are three CPCHs in this set, each of them would include a signature pointer into the signature set array, for example:
CPCH#1: SIGNATURE POINTER = LOC1
CPCH#2: SIGNATURE POINTER = LOC4
CPCH#3: SIGNATURE POINTER = LOC8
This description provides the following signature mapping:
LOC1: SIG 1 MAPPED TO CPCH#1
LOC2: SIG 2 MAPPED TO CPCH#2
LOC3: SIG 3 MAPPED TO CPCH#2
LOC4: SIG 4 MAPPED TO CPCH#2
LOC5: SIG 5 MAPPED TO CPCH#3
LOC6: SIG 6 MAPPED TO CPCH#3
LOC7: SIG 7 MAPPED TO CPCH#3
LOC8: SIG 8 MAPPED TO CPCH#3
This approach provides flexible signature mapping with compact data transmission.

Pilot bit patterns are not defined for the message part
Refer to the tables [1-2] in section 5.2.1 referenced in the text.

Coverage is limited if higher spreading factors than 64 are not allowed. Therefore the upper limit of SF >should be increased (e.g. to 256).

It is a good idea to include lower rates especially in light of the fact that SF of 512 in the downlink can be used and the DL code resource usage is no longer an issue. So, we agree with this point.

GBT- Summary of CPCH Related Clarification
Proposed changes to 7.4
1. Moving section 4.6 from 25.214 to 7.4 of 25.211

2. We propose that Tcpch be identical to RACH [0 or 1]. So we propose to remove the following phrase from 7.4 [However, the set of values for Tcpch is TBD]. The reason for this is that with introduction of RACH sub-channel scheme into CPCH, longer inter-preamble distances are introduced and there is no need for other Tcpch values].
3. We should also update 25.214 [section 6.2] to reflect the RACH sub-channel scheme, we should make a reference to that in this section as well to clarify any mis-understanding that might arise due to introduction of RACH sub-channel scheme.
4. We should make a clear reference to the Figure 26 in the text [removing reference to figure 1 in section 7.4].

Proposed changes to section 5.2.2.2
1. Replace "could be to "shall be" in section 5.2.2.2.2
2. We should use spreading factor of 512 for DL-DPCCH [message control part] to save bandwidth. [Philips comments]. We should add the following sentence to the last paragraph in section 5.2.2.2.5: "The spreading factor for the DL-DPCCH (message control part) shall be 512. Table x reflects the DL-DPCCH fields. [The first two rows of table 10].
3. We should use SF of 128 and 256 for the message part as well, [Philips comment]. So, based on these we will propose some changes to 5.2.2.2.5.
4. section 5.2.2.2.5: change the sentence "Each message consists of N_Max_FRames 10 ms frames" to "Each sentence consists of up to N_Max_Frames 10 ms frames". [Philips suggestion] We should add : "N_Max_Frames is a MAC parameter. [Clarification requested by Nokia].

GBT – Proposed Modification to 25.214
1. Removal of section 4.6 PCPCH synchronization.
2. Inclusion of sub RACH channel scheme. CPCH slot selection for CPCH Access Preamble (AP) is identical to that for the CPCH slot selection, As will be described in the REWRITTEN SECTION 6.2 OF 25.214. Note that GBT does not believe that the Collision Detection preamble should be subjected to the slot selection and sharing scheme due to loss of performance.
3. Tcpch should be set to 0 and 1.
4. DL-DPCCH SF should be 512.
5. We propose to rewrite section [small adjustment] 6.2 of 25.214 to indicate that MAC does not get involved with power level control in phy. However, note that for CPCH, the power level control is more involved since control of the access process is transferred back and forth between MAC and phy until a CPCH Channel is accessed.

GBT – Proposed Modification to 25.211
Proposed changes to 7.4

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2. We propose that Tcpch be identical to RACH [0 or 1]. So we propose to remove the following phrase from 7.4 [However, the set of values for Tcpch is TBD]. The reason for this is that with introduction of RACH sub-channel scheme into CPCH, longer inter-preamble distances are introduced and there is no need for other Tcpch values].
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Proposed changes to section 5.2.2.2
1. Replace "could be to "shall be" in section 5.2.2.2.2
2. We should use spreading factor of 512 for DL-DPCCH [message control part] to save bandwidth. [Philips comments]. We should add the following sentence to the last paragraph in section 5.2.2.2.5:
"The spreading factor for the DL-DPCCH (message control part) shall be 512. Table 10 reflects the DL-DPCCH fields. [The first two rows of table 10].

3. We should use SF of 128 and 256 for the message part as well, [Philips comment]. So, based on these we will propose some changes to 5.2.2.2.5.
4. section 5.2.2.2.5: change the sentence "Each message consists of N_Max_FRames 10 ms frames" to "Each sentence consists of up to N_Max_Frames 10 ms frames". [Philips suggestion] We should add : "N_Max_Frames is a MAC parameter. [Clarification requested by Nokia].

GBT:
NEC had suggested the use of RACH-like coding for the CPCH message part in the e-mail discussions prior to R1#7. GBT had counter-porposed the use of DCH coding for CPCH, since the message part of CPCH is similar to the DCH in many ways. Based on this and the fact the TFCI for CPCH has been agreed to in the previous meeting, GBT is proposing the removal of note 1 in 4.2.13.3 of 25.212 and addition of two enteries in Table 1 [section 4.2.3 of 25.212] to close the loop on CPCH matters in 25.212.

Philips:
As I think I mentioned in another email, it may be necessary to pre-define a limited set of TFs and TFCs for use in CPCH (otherwise the signalling load will be significant). This is an argument for making CPCH coding more like RACH. I can see problems if there are a large number of coding options available for CPCH.

Philips and GBT:
Philips> Although it was agreed in principle to use TFCI for CPCH, I do not support the idea that the CPCH rate may change during transmission. For example in Tdoc b71 it was suggested that this could be done by UTRAN, but on reflection I cannot see how the necessary signalling can be done.

GBT> Two points: 1) we only suggested to down rate for situations where UTRAN requires to reduce the load [short term relief]. 2) this can be signalled through the DL-DPCCH, since there are 4 bits allocated for signalling data.

Philips> In addition I think a limited set of TFCI's should be defined for CPCH.
GBT> I have seen this comment in other e-mails and I am not sure what your reasoning behind this statement is, could you expand on this point?

The way I see it we need several rates [16, 32, 64, 144, 384,etc.]. We should support vbarious coding rates:
1. 1/2
2. 1/3
3. no coding
4. no coding
Then we should support various interleaving depths [TTIs] such as 10, 20, 40, 80 ms. So, there might be some combinations here. In oirder to put things in perspective and carry on the discussion, we would like to know Why we should have limited number of TFCI's for CPCH?

Philips> I think the attached liaison statement (from ad hoc 4) captures my concerns (although for RACH, rather than CPCH). In my opinion the problem for RACH and CPCH is similar. I guess this issue is for both WG2 and WG1. If WG2 agrees on a limited set of transport formats for CPCH, then probably WG1 should reflect that in the Layer 1 specification.

Philips> If the power control preamble is retained in the specification it should support FBI. This will enable the Tx diversity loop (if present) to converge before the message part starts.

GBT> Sounds good.

Philips> The simplest solution may be to remove the preamble (unless there is any quantified paeformance improvement shown from having it).

GBT> We have presented our arguments in favor of retaining it and in fact for higher fading rates, it does not need much justification. For lower fade rates, it is still useful since the gap between the last AP and PC-preamble could be 10 ms. And in low fade rates such as 10 Hz, this could translate into a maximum of 12 dB offset in that time period [30 dB dip in 25 ms]. So we think there is compelling reason to have the power control preamble, however, we might only need a couple of slots to adjust in case of slow fading so introducing the flexibility is beneficial.

So to summarize our positions:

1. We still do not have a position on the necessity for limited set of CPCH?
2. It looks like, use of FBI for tx diversity on Power control preamble makes
sense.
3. On the pc preamble, we should make it flexible length so it can serve the different fading environments appropriately.

Philips:
On the subject of downlink signalling to change the rate in the uplink:
In a previous message (Re: Comments on 25.214/CPCH (sesponse to Philips)) you said "No, currently signaling is not supported on DL-DPCCH. ARQ messages return on FACH as specified in WG2 documents." So I am confused as to your position on this point. (unless you mean that ARQ is not supported on DL-DPCCH, but other signalling could be). If signalling on DL-DPCCH is required, the perhaps the SF should be 256 (or both 512 and 256 should be supported). But I accept your argument that the power control preamble has some merit.

Nokia:
On the rate change of CPCH:

Indeed a good question is that if it is assumed that CPCH packet length is such that it is known before hand and ARQ signalling comes after the FACH provides ARQ request, thus then why should CPCH use TFCI to vary the data rate? The only thing I could come up would be with very high rate CPCH when the last frame or interleaving period is not full, but then again the possible rates should be propably very few. For the alignment with RACH indeed to have similarities there would be good.
GBT's Response:
The length of the packet is not known by UTRAN. The MAC UE might receive data in the midst of the transmission and form another tranport block of size 10,20,40, 80 ms and send it to PHY ofr tranmsision. This is not far fetched considering the packet train mode within a packet call. The main motivation to have the capability to down rate was to give UTRAN the capability to reduce CPCH load if required. There was no proposal to up-rate since this creates problem in BW management. Use TFCI was agreed to in the previous meeting to enable transmission of packets that are received mid-transmission [among other reasons]. Having a variable size transport block within a singel transmission coulkd also be anotehr reason.
Nokia:
For the power control preamble I think that we should be realistic to what extent we want to have flexibility there. At most I could consider that either the preamble is there or then it is not, thus lenghts of 0 and 10 ms would be used.
GBT's Response
We could agree to this as well. However, having the flexibility allows us to remove any hit on Eb/N0 requirement, while not spending too much on the channel-occupancy. In other words, i we chose to have 1.33*2 ms pc preamble for a 30 ms tranmsision, we will only take a 10% hit on throughput efficinecy versus 30% hit [10 ms pc preamble for a 30 ms data]. So, the flexibility is useful.
Nokia:

Again with this discussion I would just like to refer to RACH simulation studies which showed once upon a time that for RACH is was somewhere around 10-20 ms when the fast power control would bring benefits for the operation. Therefore simulations would be good to clear this thing out. If Tim could provide some results it would be most usefull.

GBT's Response

I agree that simulation under various fading conditions could be helpful.

Nokia:

Also from the network side we might be interested just to have larger step size for power control in the first CPCH frame and forget the CPCH power control preamble if we can correct the possible power difference in few slots introduced during CPCH access procedure.

GBT's Response:

This is another possibility, but the use of 10 ms pc preamble reduces any raise in Eb/N0 requirements in the first few slots and helps convergence for The TX transmit diversity if FBI field is used.

Nokia:

As long as the CPCH power control preamble is exactly the same as "normal" DPCCH frame there is not complexity issue as such involved from the terminal point of view, especially if the lenght is 10 ms as well.

GBT's Response:

I guess if we retain the pc preamble, this is an argument for not having it as a multiple of the slot n*slot_length. However, when the trasnmission is worth of a few frames, then 10 ms added_channel_ occupancy is not so desiable.

Nokia:

There is indeed added delay in CPCH with repect to RACH, thus in this respect there migh be differences. From the performance perspective if the packet time for transmission would be short, then RACH would most likely be more effecive with 20 ms as well, which could be considered for RACH for other reasons as well. (I'm not proposing to forbid using CPCH even if the transmission is below 40 ms)

GBT's Response:

This issue is a wider one which requires consideration of more parameters in Partitioning the use of RACH/CPCH/DCH for packet data.

2.2 Downlink Shared Channel (DSCH)

Ericsson:

I have some questions and comments on the Downlink Shared Channel concept:

If I understand it correctly, the DSCH concept is based on a code resource (a node in the code tree) that can be shared by several users in parallel.

- Question:

Is the PDSCH defined as the entire code resource or is the PDSCH a specific part of the code resource used by one user, i.e. the Code resource is dynamically split into several PDSCHs? I would assume that it is the later but it is not really clear.

Nokia: The 25.213 addresses the PDSCH as follows: "In case the OVSF code on the PDSCH varies from frame to frame, the OVSF codes shall be allocated such a way that the OVSF code(s) below the smallest spreading factor will be from the branch of the code tree pointed by the smallest spreading factor used for the connection. This means that all the codes for UE for the PDSCH connection can be generated according to the OVSF code generation principle from smallest spreading factor code used by the UE on PDSCH. In case of multicode PDSCH allocation, the same rule applies, but all of the branches identified by the multiple codes, corresponding to the smallest spreading factor, may be used for higher spreading factor allocation." As such I understand that for a single UE, the PDSCH is the code resource the UE can

use as there is no relevance for the of the code resource that UE is not using. Naurally the Node B has a bit wider look on the PDSCH, as then PDSCH is seen to be the entire code resource reserved for DSCH use.

In general, the description of Downlink Shared Channel in 25.211 is rather confusing: In both 5.3.3.5 and 7.2 there seems to be an almost random mix between the use of the terms DSCH and PDSCH. As far as I understand, DSCH should be replaced by PDSCH in most places. As an example, it is the PDSCH that has a spreading factor, slot structure etc.

Nokia: I agree ....

Figure 20 does not show the frame structure but rather the slot structure (OF THE PDSCH!!!). Actually, I do not think Figure 20 gives very much information at all. It just shows that the PDSCH carries only data.

Nokia: I think the figure 20 should be indeed removed and replaced by table that has the bits/frame and bits/slot as in Table 15 for Secondary CCPCCH with zero pilot and not TFCI. (Then the values are actually the same when those lines are taken only). And PDSCH should be used in most places.

"DSCH may consist of multiple parallel codes"??? I do not think this would be correct even if one wrote "PDSCH may consist of multiplex parallel codes" because a physical channel is per definition one code. What is probably meant is that the DSCH may be MAPPED to something (in line with my first question it is not fully clear to me if the DSCH is mapped to a PDSCH or a part of a PDSCH). Something similar to the discussion on multi-code for DPCH(Section 5.3.2) should be used.

Nokia: This 25.213 quoted earlier has some clarification on this, but indeed the mapping to parallel PDSCH codes could be perhaps the correct term in case of multicode transmission with DSCH. Especially if we want to keep align with downlink DPCH in section 5.3.2.

Will the TFCI just inform the UE that it should read the PDSCH or will the TFCI also inform the UE what part of the entire DSCH code resource to read? In the later case, is there any ideas how that info will be coded onto the TFCI?

Nokia: What has been discussed previously is that TFCI gives the parameters including the spreading factor on PDSCH. In case it is desired to have more than one alternative codes for PDSCH for that UE for a certain spreading factor then basically TFCI will indicate combinations that have no other differences but different OVSF code.

Panasonic:

Does that mean that there different cases ? Case A) TFCI -> Spreading factor Case B) TFCI -> Spreading Factor + Code Number

Nokia:

Let's assume that at a simple case we have 4 cases (i.e. 2 bits on TFCI) for DSCH activity. (Just an example)

A) DSCH with "full" rate and lowest SF (for example 4), TFCI value being mapped to the channel coding & rate matching parameters like with DCH, extra item in the mapping is the OVSF code used.

B) DSCH with "half" rate and SF 8, TFCI value being mapped to the channel coding & rate matching parameters like with DCH, extra item in the mapping is the OVSF code used.

C) DSCH with "half" rate and SF 8, same set of values as in case B, only the OVSF code is different

D) No data on DSCH

Some more questions:

1) First of all what happens with TFCI if there is no data on DSCH and DCH. Will it be gated and only be transmitted if there is data on the DSCH or DCH ?

Nokia: Then TFCI corresponds to the DTX case on DSCH and DCH (Like with DCH only when TFCI is applied)

2) What is signalled with the TFCI when the DSCH is mapped onto multiple PDSCH ? Can TFCI signal multiple code numbers ?

Nokia: From the previous example a value could correspond to a case that multiple codes are to be recived (as with TFCI for DCH when mapped to multiple downlink DPCHs)

3) How is the TFCI used when there are additional variable rate TrCH on the downlink DCH ? What are the limitations ?

Nokia: Basic limit applies with 1024 combinations for any set of transport channels using TFCI

4) How are these different cases coded onto the TFCI ?

Nokia: I suppose previous examples and DCH principle should give the answer. The DSCH case is easy understand once you are familiar how the TFCI works with DCH, to the "table" mapping to one TFCI value one just adds with all the rate matching etc. parameters the OVSF code.

5) What is the TFCI split mode in TS25.212 section 4.3.2 about? I guess it is used when DCH is in soft handover and DSCH not ? There should be some more information why this is needed and when this mode is entered.

Nokia: This is due to the desire at higher layer in some cases to have serving and controlling RNC different in case of DSCH+DCH. This is something not dependant on the physical layer as long as we provide the split mode. (This has been discussed in WG2 to my understanding)

Panasonic:

I know we are moving into an other Ad Hoc group, but how are the TFI that we receive from MAC with the Transport Blocks of the different TrCH mapped to the TFCI in the Physical Layer ? The coding of TFCI bits into TFCI code words is described very detailed in 25.212, but where do the TFCI bits come from ? Even if it is a simple mapping from several TFI to the TFCI it has to be specified somewhere in the Physical Layer specification. For a single TrCH I assume TFCI is equal to TFI. For several TFI we at least need to know, where each TrCH is arranged referred to the LSB and MSB. Is this described somewhere or discussed in any of the Ad Hocs ?

Ericsson:

Assuming a number of transport channel (N), each with Mi transport formats, there are a total of M1*M2*...*MN transport-format combinations (I assume that there are no restrictions in the combination of transport formats of different transpotr channels). Each of these TFCs is mapped to an uncoded TFCI, e.g. TFC1 is mapped to TFCI1, TFC2 is mapped to TFCI2, etc. If there

are restrictions in the combination of transport formats, we simply remove these combinations from the list, before we map to the different TFCI.

TI:

TFCI generation issue was discussed in the Ad Hoc 4 in the last WG1 meeting. Please see Tdoc 99d59, AH04 report. You can find the current status of the issue.

Ericsson: In Section 7.2. I do not think that the timing is "ASYNCHRONOUS". It is just a timing with a specific alignment depending on the timing of the DPCH. I hope it is still synchronous and not jumping around randomly.

Nokia: I agree, this is not supposed to be jumping around and the term "ASYCNHRONOUS" could be better covered by term "not frame synchronised with DCH", with fixed offset ... and then the values as in 25.211

In general, I think a cleaning up of the downlink Shared Channel description is needed. Especially as I think the DSCH is a rather good idea.

Nokia: Agreed

2.3 Gated Transmission in Control only substate

Ericsson

EMC experts at Ericsson have performed some test of the uplink gated transmission in control only substate. Below you find the memo I got from them. I also attach to this mail two sound-files that demonstrates how the uplink power gating at 300 and 500 Hz is percieved through a common hearing aid apparatus.
The conclusion is uplink power gating should be removed from the specifications. It should also be kept in mind that gated transmission was accepted as working assumption to allow time to evaluate these effects. Such an evaluation has now been performed.
For the downlink, we have no objections from an EMC point of view. However, it is unclear to us how the downlink scheme would work if there is no gating on the uplink. If the proponents could clarify this it would be good.

Mitsubishi

I also had some problems with the DPCCH gated transmission in uplink. This is why I wished to amend it (see attached file), using some time hopping of the period of Gated transmission. This effects in spreading the audible tone in the frequency domain, which has much less impact on the hearing aids. I hope the attached contribution (sorry, no Tdoc number yet) can show you the benefit we can get from this scheme. I am afraid however not to be able to produce in a short term the nice sound file that you produced ;). Anyway, this point is new, and open for discussion. If gated transmission is to remain in the specifications, it should be no more than working assumption, and certainly NOT a firm decision, as it is. Maybe it is still too early to remove it from the specs, though... But I have some concerns anyway on the short time scale for R99. Maybe, we could leave to R00 ?