TSG-RAN Working Group 1 meeting #8   **TSGR1#8(99)G81**
New York, Oct. 12 – 15, 1999

Agenda item: **10**

Source: **Ad Hoc #1**

Title: **Report from Ad Hoc #1: TDD**

Document for: **Approval**

1 Introduction

Ad hoc #1 meeting on TDD, Oct. 12, 1999.
Starting Time: 13:30
End Time: 17:30

2 Documents relevant for TDD

In the following, the discussion and the results on the presented documents are given.

2.1 Primary and secondary CCPCH

Tdoc G41/99 "Text proposal for TS 25.221 concerning primary CCPCH", Siemens

Discussion:
* In Section 6.2.3, the wording has to be modified to "FACH mapped *onto* ...".
* A change request has to cover also WG2 specifications.
* The abbreviations should be "P-CCPCH" and "S-CCPCH" with a hyphen like for FDD.

Conclusion:
* Ad hoc 1 recommends to agree on the principle and the text given in Tdoc G41/99 with the changes mentioned above. The related CRs for WG1 and WG2 specifications should be provided.

2.2 Superframe number removal

Tdoc G72/99 "Alignment of superframe structure for TDD mode", Siemens

Discussion:
* It should be checked whether the paging channel definition also has a reference to the superframe number.
* Sections 5.7 (PICH) and 6.2.2 (PCH) should be redrafted since there are also references to the superframe.
* Annex 1 in TS25.221: This is only an example given. The reference to a superframe should be removed, the example should be kept.

Conclusion:
* Ad hoc 1 recommends to agree on the principle and the text given in Tdoc G72/99 with the changes mentioned above. The related CRs for WG1 specifications should be provided.

2.3 Cell parameter cycling

Tdoc G16/99 "Text proposal for cycling of cell parameters for TDD", Texas Instruments

Discussion:

- There was a question whether there will be a performance degradation for the mobile station's initial synchronisation. The answer was that a small degradation may be expected.
- The main advantage is seen as the improvement of the cross correlation properties, which will allow to detect false paths. Disadvantages are that some additional cell planning may be required and there may by a slightly worse performance of initial synchronisation.
- It was clarified that the intention is that this cycling scheme is always used in the system.
- There was a question which midamble to listen to in case of GSM to TDD monitoring. Also, the same question arises for TDD to TDD handover without system frame number synchronisation. These issues should be solved.
- There was a question concerning the effect on measurements. It was stated that there should be no impact if the system frame number is known.

Conclusion:
- Ad hoc 1 recommends to draft a CR for all specifications TS 25.221, 223 and 224 which should be presented to the next WG1 meeting including solutions for the open items mentioned above. It was encouraged to send this draft CR as soon as possible via the email reflector to give time for crosscheck.

2.4 Network synchronisation

Tdoc G42/99 "Synchronisation of Node B's in TDD via selected PRACH time slots", Siemens

Discussion:
- There was a question on the accuracy of the frame synchronisation. In WG4, this is specified to be 5 µs, but the WG4 definition seems to be still a bit vague. It has to be defined what to compare with and where and how to measure; also, the test case has to be specified.
- The synchronisation scheme over the air has to fulfil the WG4 requirements.
- The power of the SCH may be sufficient to be received at the neighbouring cell since the receiving conditions may be better than that of a terminal.
- Perhaps, either of the presented methods is acceptable.
- The multipath situation has to be taken into account in the accuracy requirements.
- Air interface synchronisation is not applicable in all scenarios. It can be combined with other methods of synchronisation.
- In earlier discussions in RAN WG1 it was identified that is necessary to standardise relevant parts of the synchronisation scheme over the air in order to prevent mobiles from behaving in an uncontrolled manner.
- The power allocation of the synchronisation channel should be an operator matter.
- As a minimum solution, Iub communication should be understood and the WG3 level basic signalling (minimum set) should be supported.

Conclusion:
- Ad hoc 1 recommends to study further the different schemes for network synchronisation.

Tdoc C63/99, "LS about TDD Synchronisation Methods ", TSG RAN WG3

Discussion:
- WG1 sees that we can do synchronisation over the air and a signalling method for this is useful.
- The signalling in WG3 should be included, but this signalling should not exclude the two different physical layer solutions which are given in Tdoc G42/99. Especially for the RACH method, we should crosscheck.
- A reference to Tdoc G42/99 should be given in our answer to the liaison statement.
- There should be a hint that there should be sufficient parameters in WG3 now to introduce other layer 1 methods later on.

Conclusion:
- A drafting group will prepare an answer to the LS during this meeting.

2.5 Joint predistortion

Tdoc F17/99 "Impact of transceiver chain phase imbalances on Joint Predistortion performance", Bosch

Tdoc G20/99 "TDD transmit diversity with Joint Predistortion – further simulation results", Bosch

Tdoc G37/99, Bosch, contains the text proposal related to joint predistortion

Discussion:
- Some companies support the introduction of joint predistortion as an optional method, others raised concerns.
- There was a remark that JP is quite sensitive to errors in UL channel estimation. While Tx diversity performance will asymptotically approach the one antenna case in case of channel estimation errors, joint predistortion will converge against a bit error rate of 0.5.
- It was mentioned that JP can not be used for packet transmission and high bit rate when there is a higher delay between UL and DL transmission.
- JP always has to be used for a complete time slot. This has an effect on the trunking efficiency.
- It was mentioned that the simulation results are for good UL conditions (8dB). However, the noise level is different in UL and DL due to the fact that there is only one receiver antenna in the DL while there are two in the UL. A value of 5 dB to 6 dB was seen as more realistic.
- It was mentioned that the joint predistortion complexity in the base station is approximately equal to the complexity of joint detection for a zero forcing block linear equaliser. However, there was a remark that this complexity comes in addition to the complexity of a joint detector, not instead of a joint detector.
- There was a question whether JP requires an estimation of the speed of the mobile since this will bring additional complexity.
- There was a remark that in the JD simulations, there is a fixed amount of power for every user while for JP, a sort of fast power control is included and also a global power sharing among all users. This will improve the results for JP and therefore, the conditions for JD and JP simulation results are not comparable.
- It was mentioned that JP may have an impact on the power amplifier, since the peak to average ratio may be worse. Bosch stated that their investigations show that there is no effect on the power amplifier.
- It was mentioned that JP gives advantages in terms of battery consumption as shown in a previous input paper.
- There was a remark that JP is a joint method so that all users in a time slot are corrupted if one of them starts to move. Bosch mentioned that their first investigations show that the effect is not so large.
- It was mentioned that JP will lead to signalling overhead.

Conclusion:
- The concerns should be summarised by the opponents for the next RAN WG1 meeting including related complexity and/or performance analysis.
- Both the proponents and opponents should analyse which are possible application scenarios/environments for JP.
- The proponents should analyse the effect of fast power control which is implicitly assumed in the JP analysis on the performance results.

2.6 Open loop TPC

Tdoc E60/99 "OL-TPC scheme in case of adoption of transmit diversity to BCH in TDD mode", Panasonic

Discussion:
- The text proposed should be more specification-like.
- The proposal should be reworded to mention two options instead of three: "with/without two midambles in use" instead of "beamforming, Tx diversity and no Tx diversity".

Conclusion:

- Ad hoc 1 recommends to agree on the open loop TPC scheme given in Tdoc E60/99. The related CR for WG1 specifications should be provided taking into account the comments mentioned above.

3 Conclusion

It is recommended by Ad Hoc #1 on TDD to modify the existing set of WG1 specifications based on the recommendations given in section 2.