

Agenda item: 5.3.1
Source: LG Electronics Inc.
Title: Discussion on BCCH Update
Document for: Discussion, Decision

1. Introduction

A mechanism for efficient reading of BCCH is beneficial in UE's battery performance point of view. In WCDMA, a value tag is used to indicate whether there is any change in SIBs. Because this will impact UE battery performance anyway, reception of even value tags should be further reduced.

2. Discussion

P-BCH and DL-SCH can be used to deliver BCCH. On DL-SCH, SU-1 indicates the scheduling information for other SUs.

Upper layer data or signalling is transferred over U/D-SCH and the resource for U/D-SCH transmission is indicated over L1/L2 control channel. This will be also the case for the reading of SU-1. In other words, the information on the radio resources used for SU-1 also will be indicated by L1/L2 control channel. Then, using the L1/L2 control can be one solution for notification. With this, the UE does not need to decode DL-SCH when there is no need. We foresee two possible approaches.

First approach is to allocate several identifiers for BCCH. For example, let's assume that two SU-1-RNTIs are allocated for the transmission of SU-1. Then, by alternating the used SU-1-RNTI, eNB can indicate to the UE that information over SU-1 has changed or not. At UE side, just simple comparison of current RNTI with previous RNTI, the UE knows whether there is a change in BCCH or there is a need to read BCCH.

Following figure 1 shows an example of first approach.

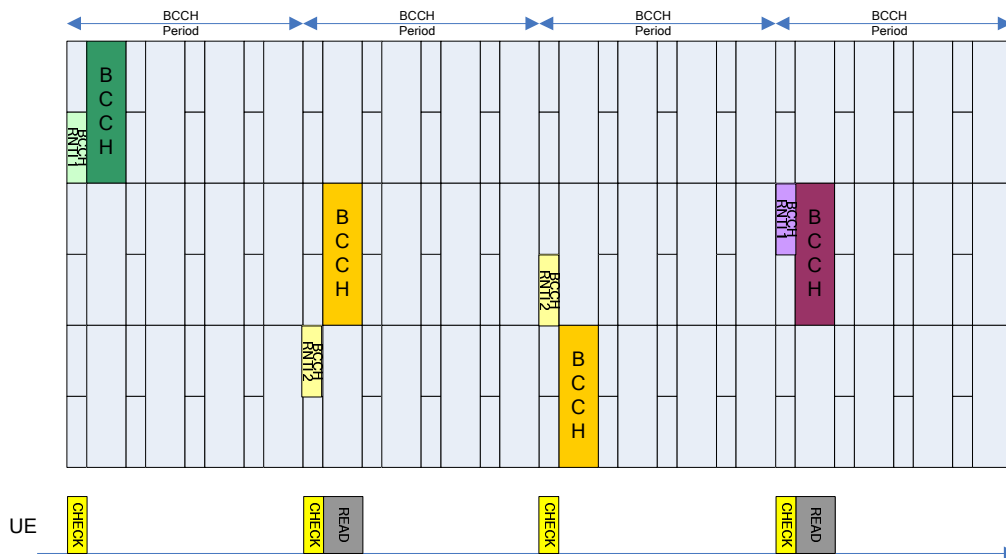


Fig. 1 Approach 1 using multiple RNTI2

1. At the moment defined by BCCH period, a UE reads PDCCH to check a change in BCCH contents by looking BCCH-RNTI. In this example, it is assumed that BCCH-RNTI used in previous period is BCCH-RNTI 1. Accordingly, the UE skips reading of BCCH because there is no change in the used BCCH-RNTI. The UE can sleep until next start of BCCH period. Here it is assumed that only two RNTI is allocated for BCCH.
2. At the next start of BCCH period, a UE checks PDCCH. Now that the UE finds that BCCH-RNTI 2 is used, it knows that there is a change in BCCH contents. Accordingly, the UE receives the PDDCH that is indicated by PDCCH and read BCCH.
3. At the next start of BCCH period, a UE checks PDCCH. Because same BCCH-RNTI as previous received BCCH-RNTI is used, the UE can skip reading of BCCH and goes into sleep.
4. At the next start of BCCH period, a UE checks PDCCH. Now that the UE finds that BCCH-RNTI 1 is used, it knows that there is a change in BCCH contents. Accordingly, the UE receives the PDDCH that is indicated by PDCCH and read BCCH.

Second approach is to allocate one BCCH-RNTI for BCCH with some more fields inside L1/L2 control channel. Because L1/L2 control channel can include several fields, some field can be used to indicate any changes in BCCH contents or the need to read BCCH. One field for that purpose can be value tag. As usual, a change in value tag can be used to indicate the change BCCH. This approach is shown in the following figure.

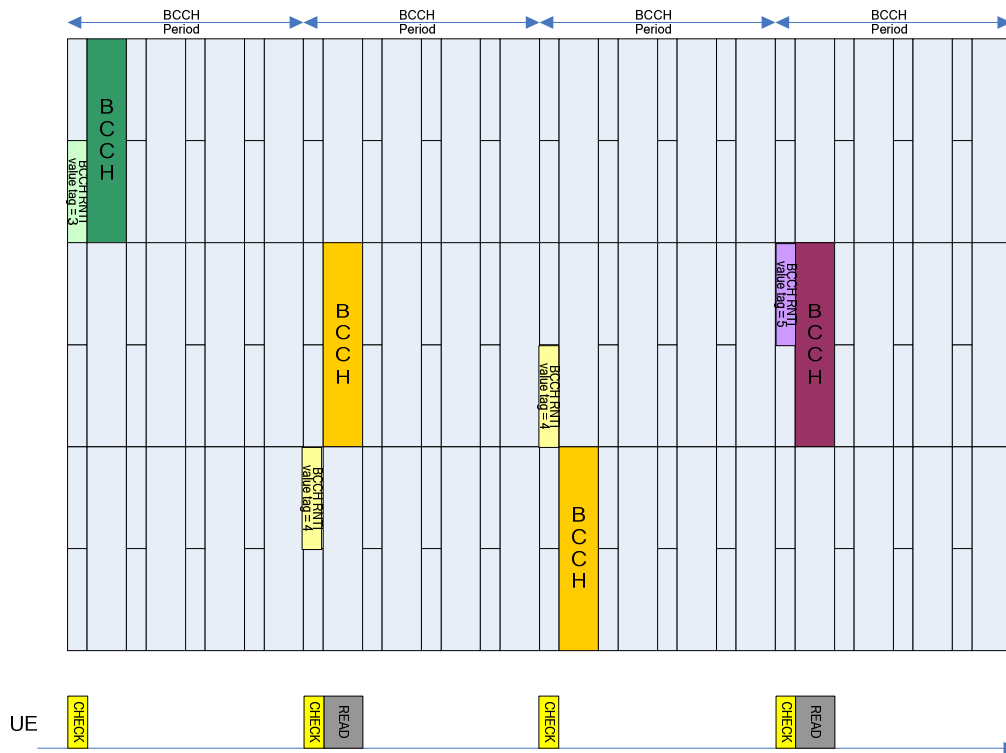


Fig. 2 Approach 2 using value tags

1. At the moment defined by BCCH period, a UE reads PDCCH to check a change in BCCH contents by looking value tag delivered over PDCCH. In this example, it is assumed that value tag used in previous period is 3. Accordingly, the UE skips reading of BCCH because there is no change in the used value tag. The UE can sleep until next start of BCCH period.
2. At the next start of BCCH period, a UE checks PDCCH. Now that the UE finds that value tag is changed to 4, it knows that there is a change in BCCH contents. Accordingly, the UE receives the PDDCH that is indicated by PDCCH and read BCCH.
3. At the next start of BCCH period, a UE checks PDCCH. Because same value tag as previously one is received, the UE can skip reading of BCCH and goes into sleep.
4. At the next start of BCCH period, a UE checks PDCCH. Now that the UE finds that value tags is changed to 5, it knows that there is a change in BCCH contents. Accordingly, the UE receives the PDDCH that is indicated by PDCCH and read BCCH.

We believe that both approaches are beneficial to UE because it reduces UE reading time. Furthermore, compared to the mechanism in UMTS where the paging has to be broadcast in all paging occasion considering the longest DRX cycle, the proposed mechanism is resource efficient because one message that is time-aligned to the occasion of SU-1 is enough. But within the two solutions, approach 1 seems to slightly increase the number of RNTI that UE has to manage.

3. Conclusion

It is proposed to discuss solutions in section 2 and adopt appropriate one into TS.