TSG-RAN WG1 meeting #16

R1-001233

Pusan, Korea
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Agenda item: AH28

Source: Golden Bridge Technology

Title: Optimized DSCH for Cell-FACH State

Document for: Discussion and Information

Introduction

At RAN2#15 GBT presented R2-001624 which quantified the benefits of using CLPC for FACH for burtsy non real time traffic in place of DCH/DCH+DSCH. RAN2 noted that the assumptions for operation of DCH/DCH+DSCH, while correct for FDD, did not utilise certain signalling efficiencies which are currently included in TDD mode. RAN2 noted its expectation that the FDD mode will be corrected soon to take advantage of scheduled PDSCH activation period used in TDD. In this paper GBT proposes the expected corrections to FDD mode to improve signalling efficiency for PDSCH allocation. This contribution is presented to WG1 for information and discussion.

Discussion

R2-001624 documented the inefficiencies associated with the use of DSCH in FDD for bursty traffic. The assumption for use of DSCH is that the UE will transition from Cell-FACH state to Cell-DCH and back to Cell-FACH state each time there is DL data to transmit using DSCH. The distinctive features of the proposed CLPC FACH which provides efficiencies over DSCH are:

1. Minimal signaling for use of DL. CLPC FACH uses short scheduling message on FACH for use of Power Control Preamble, DSCH requires much larger Physical

Channel Reconfiguration message to signal transition to Cell-DCH, allocating a DCH with DSCH.

2. Immediate release of DL resources at the end of DL transmission, without the need for signaling. CLPC FACH protocol releases PCP resources in the frame after the directed FACH message ended. DSCH requires expiration of an inactivity timer which then triggers another Physical Channel Reconfiguration to release the DCH resources and return the UE to Cell-FACH state.

Discussion at RAN2#15 indicated that DSCH in TDD mode can use PDSCH allocation period info to efficiently schedule PDSCH for a predetermined number of frames. In TDD mode the PDSCH may be scheduled independently and does not require an associated DCH as in FDD mode. At the end of the allocation period, the PDSCH channel is released without the need for signaling.

In FDD mode an associated DCH is always allocated with the PDSCH. It is possible to add an optional PDSCH allocation period info IE to Downlink PDSCH information. When included in a PHYSICAL CHANNEL RECONFIGURATION message, the UE in the Cell-FACH state shall wait until the indicated activation time, then shall store the in-use Cell-FACH physical channel configuration, and finally shall reconfigure the physical channel to use the PDSCH with associated DCH configuration. At the end of the indicated allocation period, the UE shall release the associated DCH and restore the Cell-FACH configuration which had been stored at the PDSCH activation time. In this way the UE can efficiently transition from Cell-FACH state to Cell-DCH state to use a scheduled PDSCH for DL packet data and then transition back to Cell-FACH state at the end of the scheduled PDSCH period. This approach provides immediate release of DCH resources at the end of the scheduled PDSCH period without the need for signaling.

Also it is proposed to modify the appropriate sections of 25.331 to add the optional Store PDSCH configuration IE to Downlink PDSCH information. This IE indicates that the PDSCH physical channel IEs included in the PHYSICAL CHANNEL RECONFIGURATION message are to be stored for future use. In this way UTRAN may efficiently signal the UE to use the stored PDSCH configuration by sending a very short PHYSICAL CHANNEL RECONFIGURATION message which may include only the PDSCH allocation period info IE. In this way the PDSCH configuration to be used in the signalled allocation period will be the previously stored PDSCH configuration.

Conclusion

GBT is proposing some corrections to the R2 specs to implement the fast de-allocation of DSCH. Furthermore, these corrections improves the use of DCH/DCH+DSCH with RACH/FACH or CPCH/FACH by using stored configurations to allow state changes from Cell-FACH to Cell-DCH to Cell-FACH with no delays and minimal signaling. This contribution was submitted to R1 for information and some discussions since it also has some impact on the terminal power saving feature.