

16m DL ACK Channel Design

IEEE 802.16 Presentation Submission Template (Rev. 9)

Document Number:

IEEE C802.16m-09/0209r1

Date Submitted:

2009-01-07

Source:

Hyunkyu Yu, Jeongho Park,
Heewon Kang, Hokyu Choi, DS Park

Voice: +82-31-279-4964

E-mail: hk.yu@samsung.com

Samsung Electronics Co., Ltd

416 Maetan-3, Suwon 443-770, Korea

Venue:

IEEE 802.16m-08/053r1, “Call for Comments and Contributions on Project 802.16m Amendment Working Document”

Target topic: “11.7 DL PHY control structure, especially mapping”.

Base Contribution:

None

Purpose:

To be discussed and adopted by TGm for use in stage 3 document development

Notice:

This document does not represent the agreed views of the IEEE 802.16 Working Group or any of its subgroups. It represents only the views of the participants listed in the “Source(s)” field above. It is offered as a basis for discussion. It is not binding on the contributor(s), who reserve(s) the right to add, amend or withdraw material contained herein.

Release:

The contributor grants a free, irrevocable license to the IEEE to incorporate material contained in this contribution, and any modifications thereof, in the creation of an IEEE Standards publication; to copyright in the IEEE’s name any IEEE Standards publication even though it may include portions of this contribution; and at the IEEE’s sole discretion to permit others to reproduce in whole or in part the resulting IEEE Standards publication. The contributor also acknowledges and accepts that this contribution may be made public by IEEE 802.16.

Patent Policy:

The contributor is familiar with the IEEE-SA Patent Policy and Procedures:

[<http://standards.ieee.org/guides/bylaws/sect6-7.html#6>](http://standards.ieee.org/guides/bylaws/sect6-7.html#6) and [<http://standards.ieee.org/guides/opman/sect6.html#6.3>](http://standards.ieee.org/guides/opman/sect6.html#6.3).

Further information is located at [<http://standards.ieee.org/board/pat/pat-material.html>](http://standards.ieee.org/board/pat/pat-material.html) and [<http://standards.ieee.org/board/pat>](http://standards.ieee.org/board/pat).

Outline

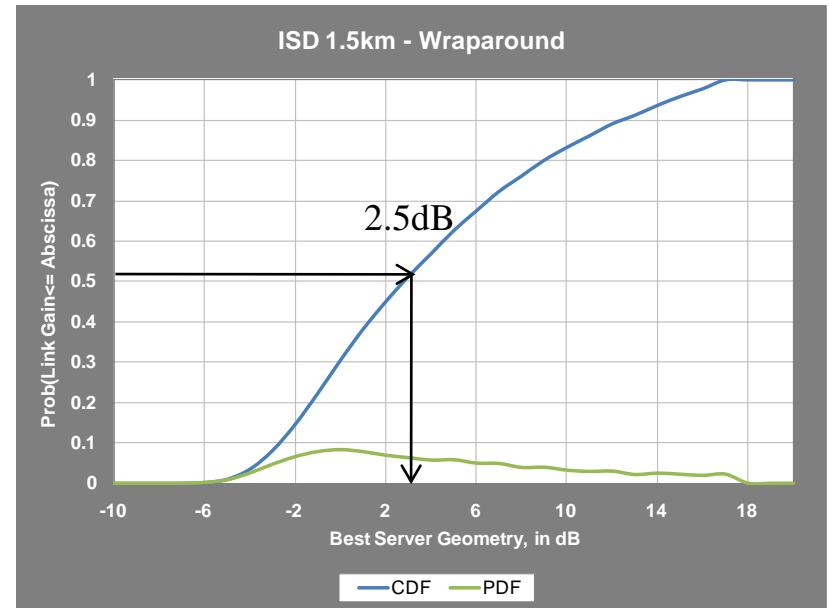
- Requirement for ACK Channel
- Design Approach
- DL ACK Channel Design
- Simulation Results
- Conclusions and Proposed Text
- Appendix

Requirement for ACK Channel

- Link Performance
 - ACK to NAK : 1%
 - NAK to ACK : 0.1%
- Derived from SDD
 - USCCH is multiplexed with data in FDM-fashion
 - Both power boosting and repetition can be used for improving link performance
 - Tone-pair permuted resource would be used
 - SFBC is good for MMO transmission
 - Channel estimation should be based on common pilot

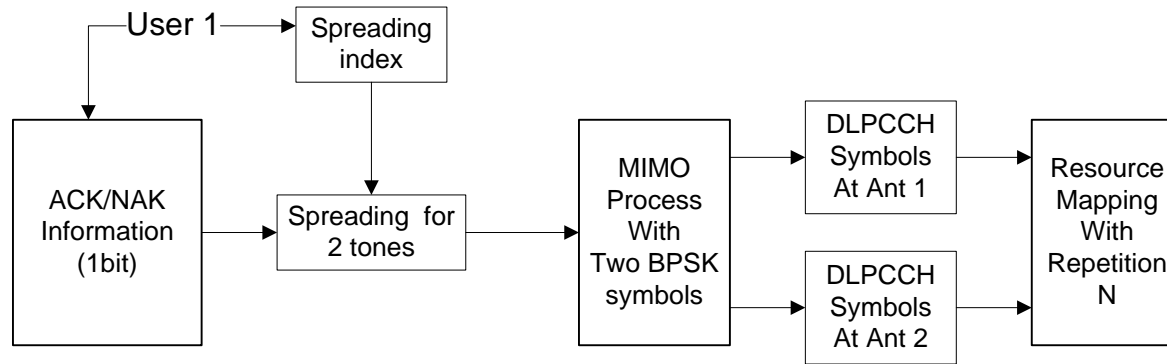
Design Approach

- Design Criteria
 - Physical overhead should be minimized
 - Link performance should be satisfied even with channel estimation impairment
- Reference SNR
 - Required received SNR in which user of 0.5 CDF point can satisfy the requirement without power boosting
 - For example, SNR 2.5dB is reference SNR in 1.5km ISD
- Need to Decide
 - Repetition number N for given common pilot boosting value

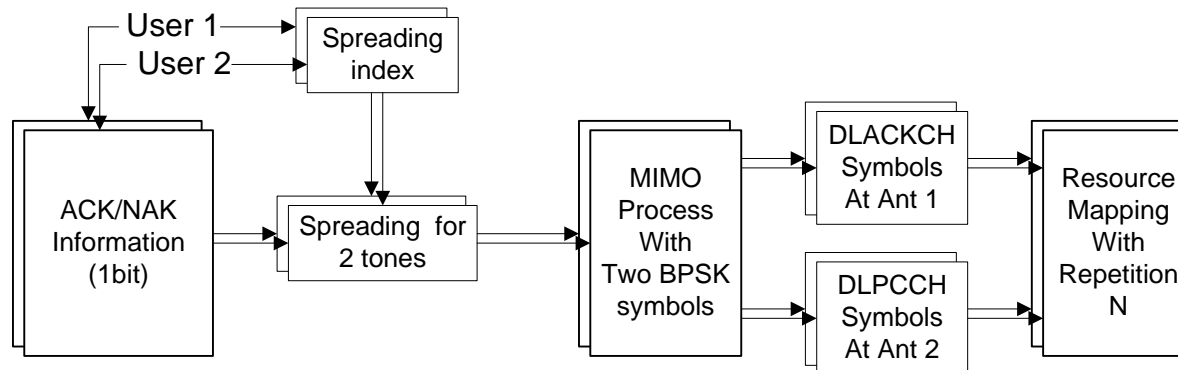


DL ACK Channel Design

- Block Diagram



– Two users are multiplexed in CDM-fashion



Simulation Results

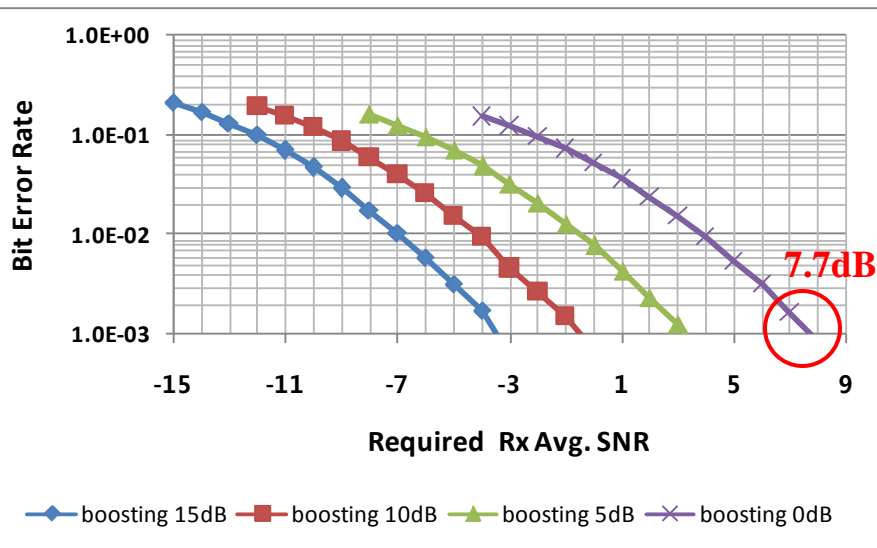
- Conditions

- MIMO : SFBC
- Common pilot boosting: 3dB*
 - * If pilot boosting is 0dB, then pilot tone power is same to data tone power with 0dB boosting
- Channel: Ped-B 3km/h
- Channel estimation: averaging within 1 PRU

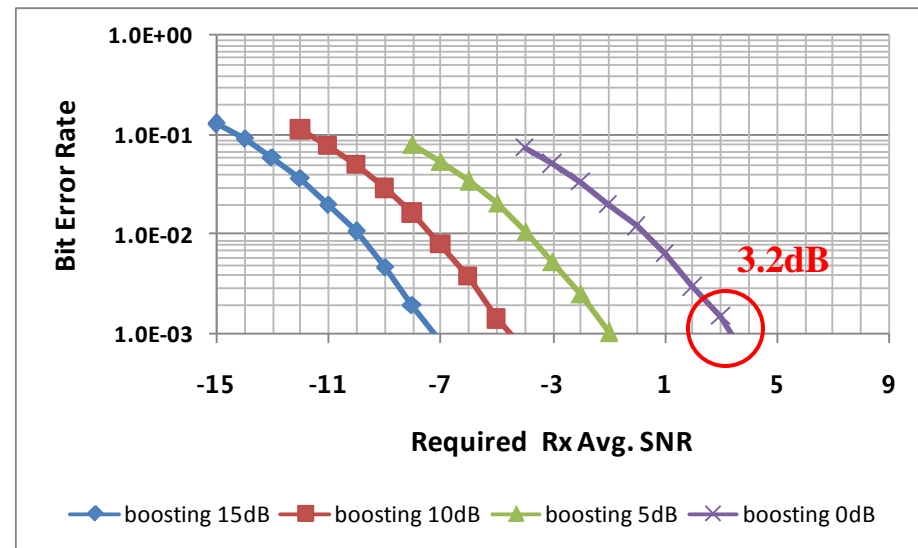
Compared to 0dB boosting, 15dB boosting can obtain only 11dB gain. This is because of *channel estimation impairment*.

Questions is how many repetitions is required for 0dB boosting to satisfy requirement?
- Requirement : BER 0.1% @ 2.5dB

1 Repetition

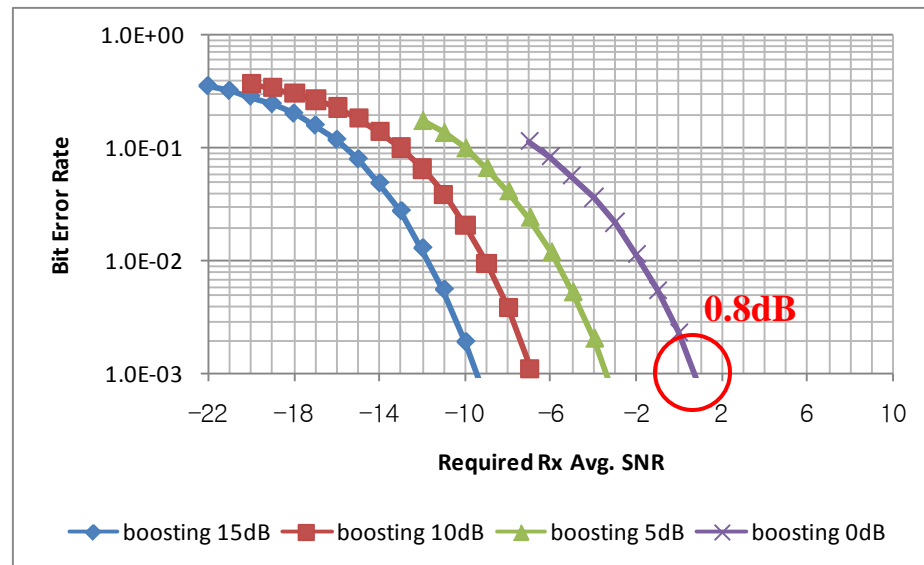


2 Repetition



Simulation Results

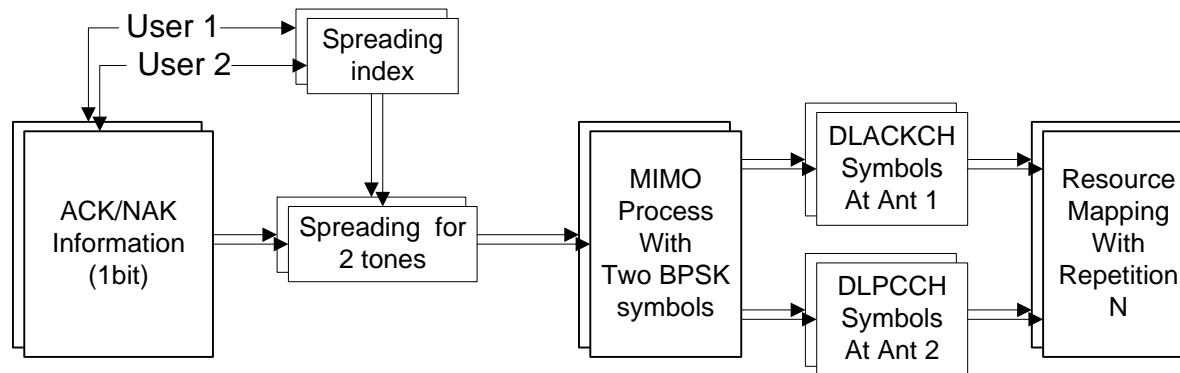
- Required Repetition N
 - Assumptions
 - Reference SNR of 0dB boosting : 50% user
 - For given geometry of ISD 1.5km, approx. 2.5dB is necessary for 0dB boosting
 - To obtain 2.5dB of Rx SNR for 0dB boosting
 - 3 repetitions are required to satisfy BER requirement (3 tones / 1 ACK)
 - Repetition N would be different for different deployment scenario
 - Thus, N information is sent in BCH



Conclusions and Text Proposal

- ACK IE

- 1 bit
- Tx MIMO scheme : SFBC
- Block diagram for ACK channel
 - User multiplexing : Max 2 user CDM



- Text Proposal

- See the latest version of C802.16m-09/0208