[Transmit Diversity scheme for BCH transmission]

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Venue:

Call for Comments on Project 802.16m System Description Document (IEEE 802.16m-08/052)

Purpose:

To be reviewed and adopted by TGm for the 802.16m SDD

Transmit Diversity Schemes for BCH transmission: 2 streams vs 1 stream

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Summary

- Purpose
  - To resolve the issue related to Tx diversity scheme for BCH transmission(which is currently FFS)
    - Transmit Diversity Schemes for 2 x 2
      - 2 stream (i.e. M = 2): Data and pilots are different among antennas
      - 1 stream (i.e. M=1): Data and pilots are the same among antennas
  - This contribution provides the considerations and the evaluation results
- Recommendation
  - Suggests 2 stream transmission for Tx diversity

PBCH/SBCH related Working Assumptions

- Resource allocation [1]
  - PBCH and SBCH use **DRU**
- Multiplexing [1]
  - PBCH and SBCH in SFH are **FDM** with data within same subframe
- Transmission format
  - The AMS is not required to know the antenna configuration prior to decoding the PBCH [1]
  - Minimum DL antenna configuration: **2 x 2** [2]

Considerations for Evaluation

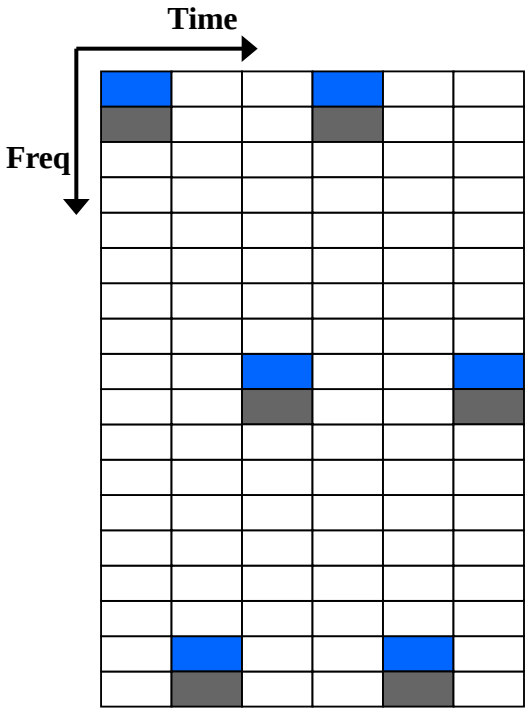
- Need performance evaluation using 2 stream pilots as common pilot
  - For FDM of PBCH/SBCH and data within the distributed region, both channels are transmitted in shared PRUs with DRU allocation. This can be achieved in following two ways:
    - Option 1: Use rank-1 precoder in shared PRUs, data channels in the DRU region are restricted to use the same precoded pilot.
    - Option 2: Use pilot pattern A as specified in section 11.5.3 [1] to share the pilot tones
- Using option1 means that data channels use only rank-1 transmission ➔ unacceptable limitation

Simulation Environments

Contents	Value
Carrier frequency	2.5 GHz
OFDM symbol	102. 86 us (with 1/8 CP)
Bandwidth / FFT size	5 MHz / 512 (used subcarrier : 432 subcarriers)
Channel Codig	CTC
Payload size	96 bits (for using full diversity)
Modulation & Code rate	QPSK ½ with 8 repetitions
Antenna configuration	2 Tx - 2 Rx
Channel estimation	PRU based 2D MMSE
Tx Diversity Schemes	1 stream: Phase rotation (rotation value = 1/256) 2 stream: SFBC
Resource unit	DRU
Pilot pattern	Pilot pattern A (no boosting)
Channel Model	Ped-B 3 km/hr, Veh-A 120 km/hr (Uncorrelated channel)

Pilot Patterns

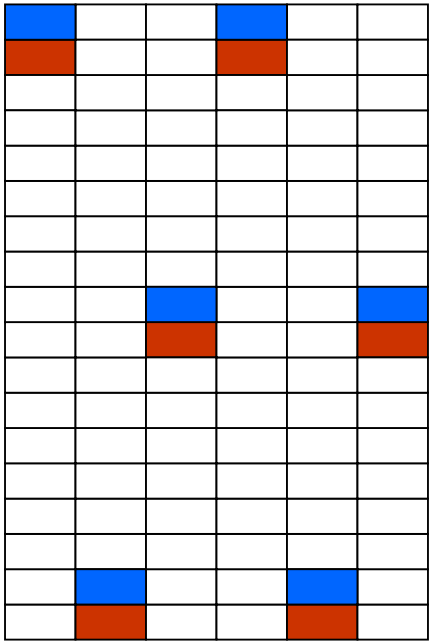
- **1 stream transmission**
  - **Uses pilot stream 1**



Pilot stream 1

Pilot stream 2 (not used for 1 stream transmission)

- **2 stream transmission**
  - **Uses both pilot stream1 and pilot stream 2**

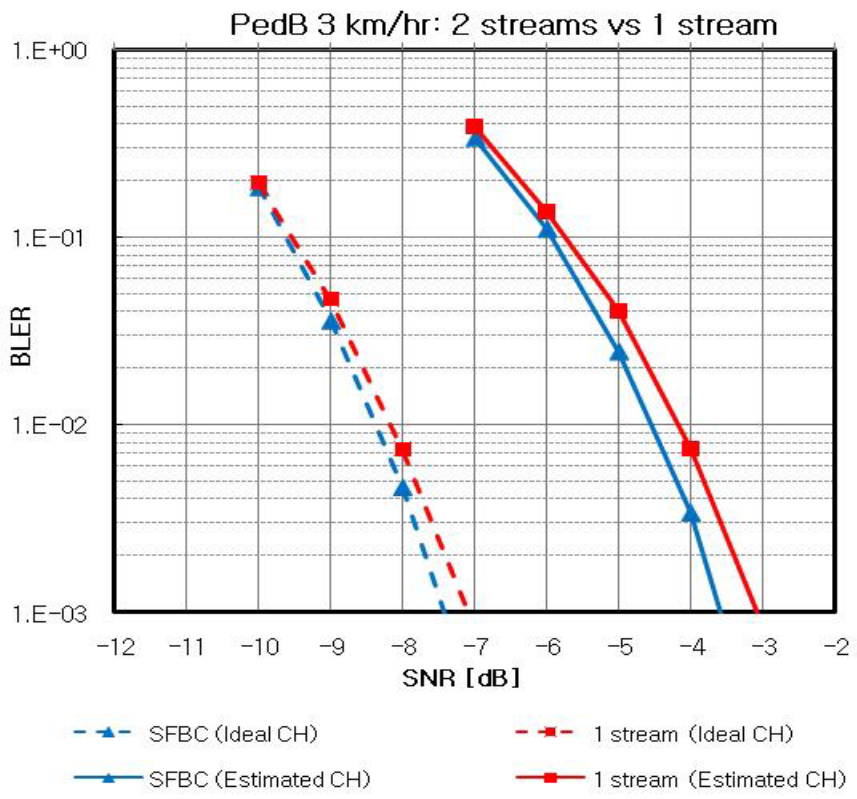


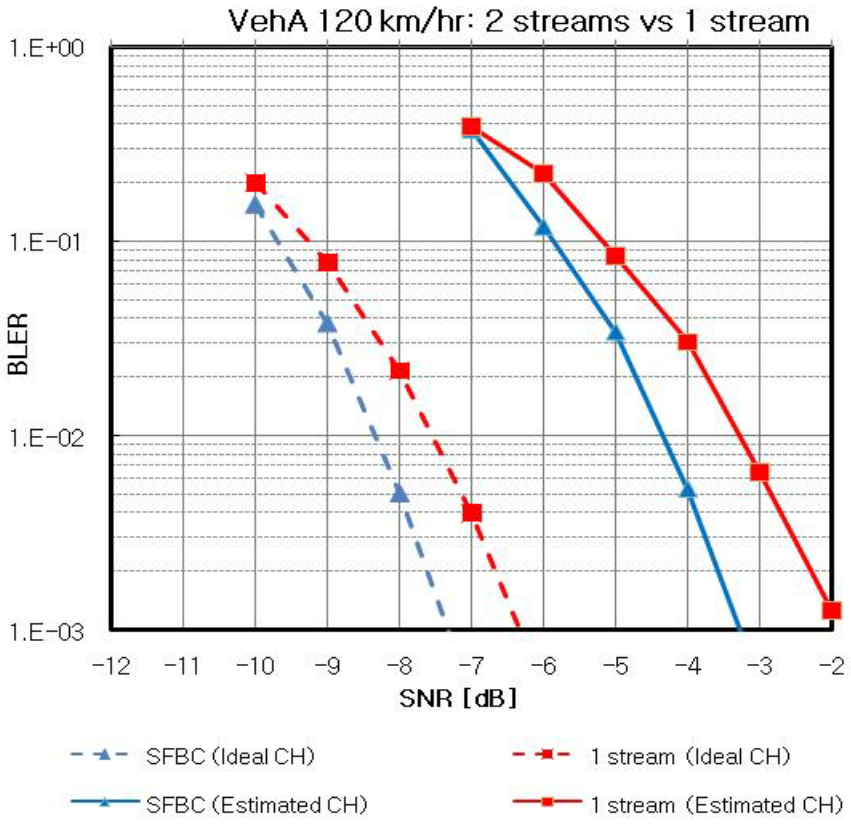
Pilot stream 1

Pilot stream 2

Performance Comparison

- Summary
  - With 2 streams pilot, SFBC is better than 1 stream transmission





Text Proposal for 80216m SDD

========== Start of text proposal ==========

Modify the sentence in section 11.7.2.2.4, page 92, line 13 as follows

Multiple antenna schemes for transmission of the PBCH/SBCH are supported. ~~Transmission of PBCH and SBCH as one stream or two stream is FFS.~~ The transmit diversity scheme for PBCH and SBCH is SFBC (i.e. M = 2 streams) using the 2 Tx rate-1 mode.

========== End of text proposal ==========

References

- [1] IEEE 802.16m-08/003r6, “Project 802.16m System Description Document (SDD)”
- [2] IEEE 802.16m-07/002r7, “IEEE 802.16m System Requirements”