IEEE 802.16m Codebook Design Guidelines for SU-MIMO

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Source: Bishwarup Mondal, Tim Thomas, Fan Wang, Amitava Ghosh
E-mail: bishwarup@motorola.com
Motorola
*<http://standards.ieee.org/faqs/affiliationFAQ.html>
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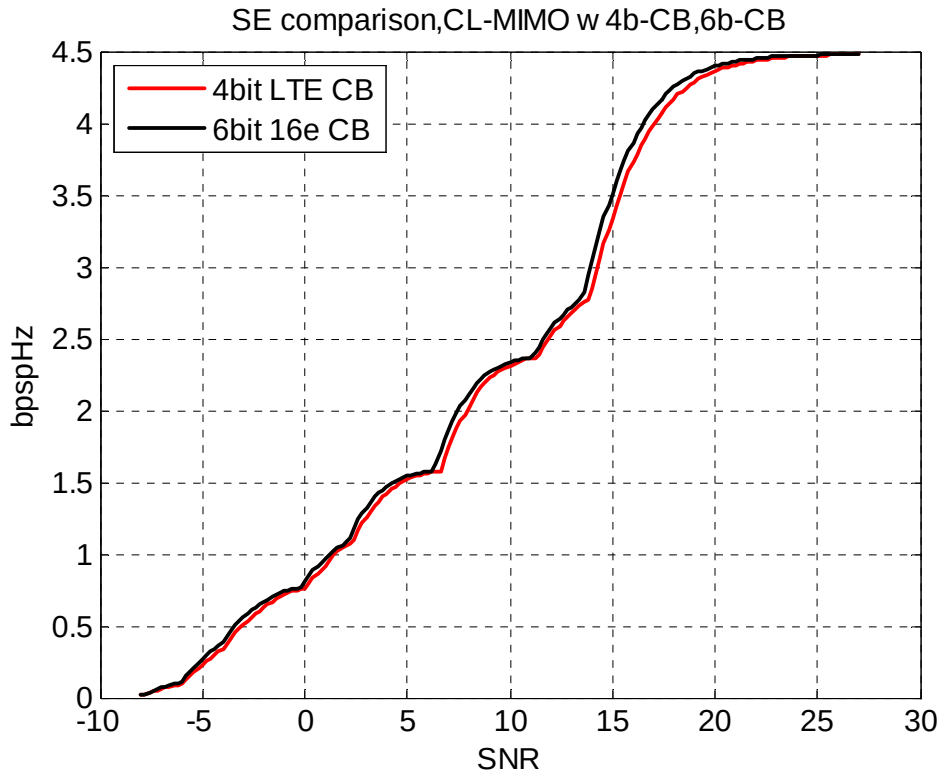
Abstract:
Proposal for 16m codebook design methodology
Purpose:
Adoption of proposed text/content as requirements for 802.16m SU-MIMO codebook design for System Description Document

Codebook Design Guidelines

- 2Tx antenna SU codebook
  - Rank-1,2 support
  - 3bits
- 4Tx antenna SU codebook
  - Rank1-4 support
  - 4bits
    - 6 bits show little additional gain (results shown later)
    - 6 bits require ~4 times more computations
  - 8PSK or 4PSK alphabet
    - Simplify codebook search computations
    - Guarantee equal gain for all antennas
  - Rank nesting property
    - Reuse computations across ranks
- 8Tx antenna SU codebook
  - 6bits (other properties same as 4Tx)

4Tx Codebook Comparison

- 4b, 6b CB comparison



Simulation Parameters 1

Parameter	Value
NFFT	1024
Carrier frequency	2.6 GHz
# Tx antennas, # Rx antennas	4 Tx, 2 Rx
Antenna spacing	4 λ for Tx, 0.5 λ for Rx
MCS	1/2 QPSK, 3/4 QPSK, 1/2 16QAM, 1/2 64QAM
Channel model	SCM Urban Macro 15^0
Mobile speed	3kmph
UL delay	5ms delay codebook feedback
Pilots	Dedicated, 2.5dB boost
Codebook parameters	4-bit LTE codebook or 6-bit 16e codebook for 4Tx, 1 codebook index feedback per band (18 subcarriers), error-free feedback of codebook index
Receiver	MRC for Rank-1, LMMSE for Rank-2
DL channel estimator	2D-MMSE based on 18x6 tile
Packet size	288/432/480 bits
DL- Allocation	Localized allocation, 18x6 tile randomly distributed in frequency
Midamble	Ideal Channel estimation for midamble

Simulation Parameters 2

- Pilot - 5.56% -1 stream
- Pilot - 11.11% - 2 streams