

Project	IEEE 802.16 Broadband Wireless Access Working Group < http://ieee802.org/16 >	
Title	Uplink MU-MIMO scheme for multiple transmit antennas	
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Re:	IEEE 802.16m-08/016r1: Call for Contributions on Project 802.16m System Description Document (SDD) (2008-03-20), Uplink MIMO schemes .	
Abstract	In order to improve spectral efficiency, this contribution proposes network coordinated beamforming focusing on downlink dedicated/control channels.	
Purpose	Adoption of proposed text into SDD	
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Patent Policy	The contributor is familiar with the IEEE-SA Patent Policy and Procedures: < http://standards.ieee.org/guides/bylaws/sect6-7.html#6 > and < http://standards.ieee.org/guides/opman/sect6.html#6.3 >. Further information is located at < http://standards.ieee.org/board/pat/pat-material.html > and < http://standards.ieee.org/board/pat >.	

Introduction

▣ Requirements of advanced mobiles for uplink

- Higher data rates
- Diversity gain/SNR gain
- Feasible low power consumption

▣ Multiple antenna mobiles

- Multiple antennas(multiple RF chains) schemes are indispensable approach for the requirements
- Beamforming/Diversity/Spatial Multiplexing

Uplink MU-MIMO

- **Single antenna CSM**
 - Efficient technique increasing throughput
 - Suitable for low cost/compact mobiles

- **Multiple antenna MU-MIMO**
 - In 16e, multiple antennas(multiple RF chains) are used to increase peak user rate or diversity gain.
 - Beamforming/Codebook based precoding can be used for MU-MIMO.
 - In this presentation, single antenna CSM and multiple antenna CSM using codebook are compared by SLS.

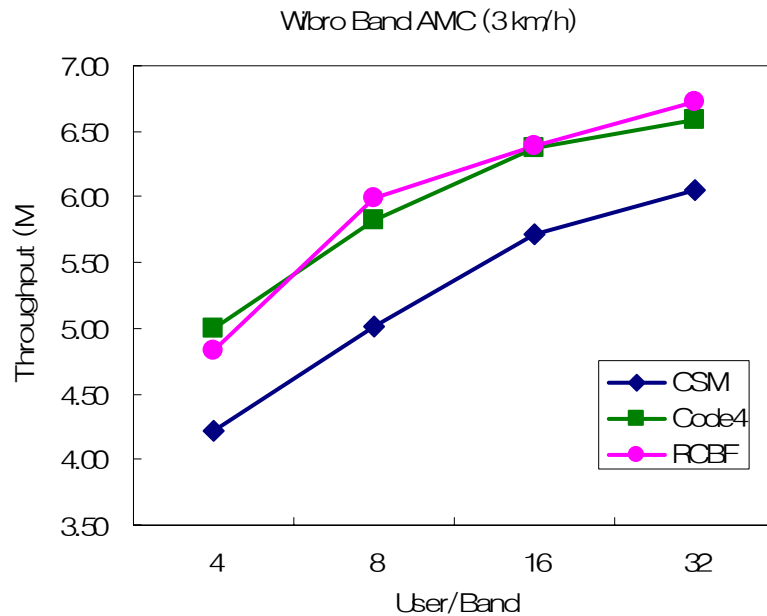
Simulation conditions

■ Simulation conditions

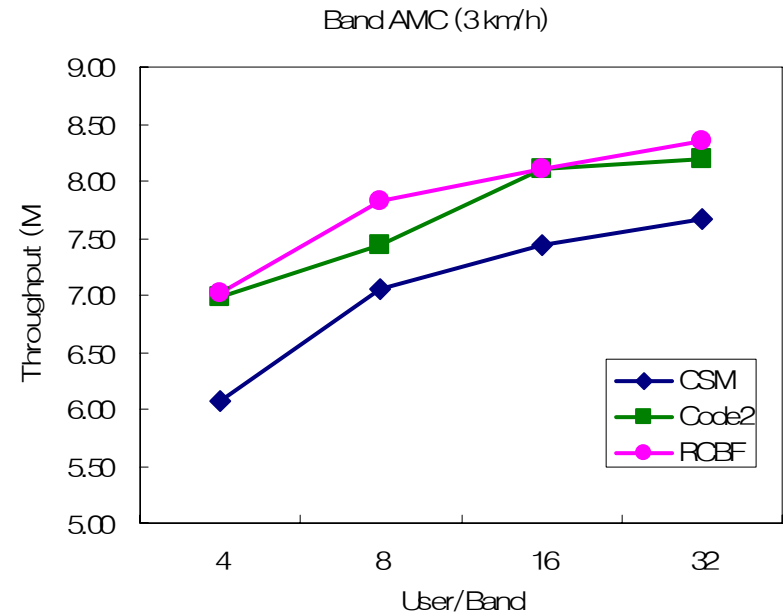
- 19 cell, 3 sector
- No Power control
- 8 band/10MHz
- 3GPP SCM channel/Suburban Macro
- PF scheduling per band
- MMSE receiver
- # of basestation Rx ant. => 2 (antenna spacing 0.5 lambda)
- # of mobilestation Tx antennas => 2 (antenna spacing 0.5 lambda)
- CSM (1 Tx Ant) vs. Codebook (2 Tx. Ant. 1 unitary matrix used)

Simulations Results

Basestation - 2Rx Antenna



Basestation - 4Rx Antenna



Codebook shows 10~15 % gain

Text Proposal

11.X Uplink MU-MIMO

For mobilestations with multiple Tx antennas, codebook based precoding schemes are adopted to increase system throughput.

References

- [1] IEEE 802.16m-07/002r4, "TGm System Requirements Document (SRD)"
- [2] IEEE 802.16m-08/003r1, "Draft IEEE 802.16m System Description Document"
- [3] IEEE 802.16m-08/004r1, "TGm Evaluation Methodology Document"
- [4 [5] IEEE P802.16Rev2/D3