

Proposal for IEEE 802.16m DL Network MIMO

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Sophie Vrzic, Jun Yuan, Mo-Han Fong, Robert Novak, Dongsheng Yu, Sang-Youb Kim, Kathiravetpillai Sivanesan

Nortel Networks

E-mail: svrzic@nortel.com, junyu@nortel.com, mhfong@nortel.com,

*<http://standards.ieee.org/faqs/affiliationFAQ.html>>

Re: IEEE 802.16m-08/016r1 – Call for Contributions on Project 802.16m System Description Document (SDD), on the topic of “Downlink MIMO Schemes”

Purpose: Adopt the proposal into the IEEE 802.16m System Description Document

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Scope

- This contribution proposes a network MIMO scheme for IEEE 802.16m.
- The overall DL MIMO scheme presented in a separate contribution (see C802.16m-08/342 "Proposal for IEEE 802.16m DL MIMO Schemes").

IEEE 802.16m System Requirements

- The TGm SRD (IEEE 802.16m-07/002r4) specifies the following requirements:
 - Section 5.7 Support of Advanced Antenna techniques
 - Section 7.1.1 Relative Performance
 - DL cell edge throughput should be greater than 2 times the reference system
- The proposed network MIMO scheme targets the above requirements.

Motivation

- In the legacy 16e system, multi-layer MIMO schemes are limited to high geometry mobiles.
 - Techniques such as soft handoff or SFN transmission can be used to improve coverage, but this leads to reduced spectral efficiency.
- In order to improve coverage and enable multi-layer MIMO schemes for all users, network MIMO can be introduced.
 - Network MIMO reduces inter-cell interference and
 - Increases the throughput for cell-edge users

Overview

- Network MIMO combines antennas from neighbouring sectors to transmit multiple streams to cell edge users.
- In order to support network MIMO, base station coordination is required.
- The base stations that participate in the network MIMO transmission can be determined from the mobiles active set.
- For network MIMO transmission, the channelization between the coordinating sectors must be the same.

Network MIMO (1/2)

- In a network MIMO zone, the pilot pattern used is the 4 antenna pattern (see C802.16m-08/172r1). Each sector transmits pilots for 2 different antennas.
- HARQ can be either asynchronous, synchronous or RAS-HARQ.
- A permutation index is used to signal the resource partition within the network MIMO zone (see C802.16m-08/176r1).
- In a diversity zone,
 - A network MIMO zone is defined by using the same channelization procedure as for FFR
 - The FFR zone corresponding to reuse one can be used for network MIMO.
 - A common hopping pattern is used by the coordinating sectors in this zone.
 - If there are no mobiles eligible for network MIMO transmission, the sector specific hopping pattern is used and non-network MIMO mobiles can be schedule.

Network MIMO (2/2)

- In a localized zone
 - The localized zones between coordinating sectors are physically aligned.
 - Network MIMO is transparent to the user in the case of asynchronous HARQ.
 - In synchronous HARQ or resource adaptive synchronous HARQ (see contribution C802.16m-08/353), only the timing of the retransmissions is different in network MIMO to account for the delay associated with coordinating the transmissions.
 - The C/I measurement pilots are located on the same tones as in the case of a non-network MIMO zone.
 - The control information is the same as in the non-network MIMO zone.

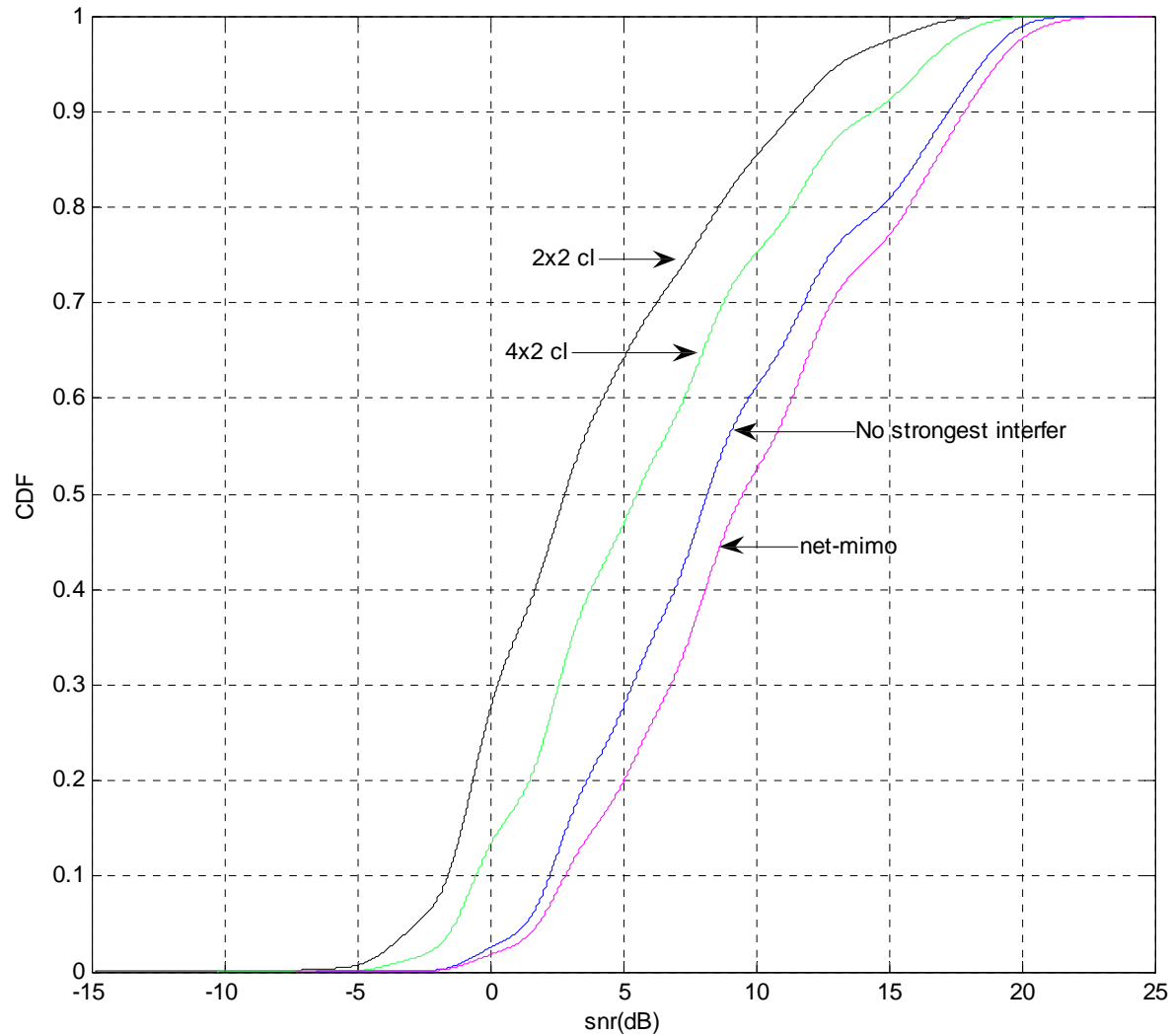
Network MIMO Procedure (1/2)

- BS Procedure
 - Configures a network MIMO zone with a neighbouring sector
 - The location of the network MIMO zone, the coordinating sector ID and the hopping pattern are signaled in the superframe header
 - Schedule a user in the network MIMO zone
 - Coordinates with the supporting sector or sectors, which includes user selection and the resource assignment.
 - Sends the control information and data to the MS.
 - Retransmission can occur either inside or outside the network MIMO zone.

Network MIMO Procedure (2/2)

- MS Procedure
 - Reports active set to the serving sector. This indicates which sectors can be used for network MIMO transmission.
 - For open loop, measures and reports the C/I for STTD or SM to the serving sector.
 - For closed loop, measures and reports the PMI, rank and C/I to the serving sector.
 - Decodes the control and data and sends ACK/NACK to the serving sector.

Network MIMO Precoding (Rank 2) SNR Enhancement



Summary

- The proposed network MIMO scheme satisfies the requirements of the TGm SRD.
- Network MIMO can improve coverage and overall system throughput.
- The design also provides minimizes complexity of both the MS and BS.

Proposed Text for SDD

- Section 11.x DL MIMO
 - [*Add content of slides 5 to this section*]
- Section 11.x.1 Network MIMO
 - [*Add content of slides 6-9 to this section*]