MIMO Strategies for the IEEE 802.16m Uplink

Document Number:

IEEE S802.16m-08/608

Date Submitted:

2008-07-07

Source:

Fred Vook, Bishwarup Mondal, Fan Wang,   E-mail: fred.vook@motorola.com

Bill Hillery, Mark Cudak, Amitava Ghosh

Motorola

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

Venue:

TGm – Call for contributions on Project 802.16m System Description Document – IEEE 802.16m-08/024 (Uplink MIMO Schemes)

Base Contribution:

IEEE C802.16m-08/608

Abstract:

Methodologies for supporting MIMO and Advanced Antenna Array Technology for the IEEE 802.16m uplink.

Purpose:

Discussion and adoption of recommended text into 802.16m System Description Document

Notice:

Release:

Patent Policy:

UL MIMO Schemes for IEEE 802.16m: Contents

- ## Overall Theme:

  - Preserve and expand on key UL-MIMO features already in the legacy IEEE 802.16e system

  - Support advanced CPE and laptop devices with two transmit antennas and more TX power than typical handset devices

MS Antenna Configurations Supported for UL-MIMO

- ## Mobile Handset / CPE
  - 1Tx, 2Rx
- ## MS/CPE with Switched Diversity
  - 1Tx, MRx
  - Single PA with switched TX diversity on UL
- ## Mid-tier CPE
  - 2Tx, MRx
- ## High-tier CPE / Laptop
  - 4Tx is FFS

Outline of methods

- ## Single User Transmission
  - SIMO & SIMO with switched diversity
  - Open-Loop STC/MIMO

- ## Multiple User Transmission
  - Collaborative Spatial Multiplexing / RX-SDMA

Single-User Transmission "Open-Loop" Methods

- ## Traditional SIMO
  - Enable switched Tx diversity from MS with multiple TX antennas but only one PA
    - Necessary features to support this are FFS

- ## STC / TX diversity for MSs with 2Tx antennas
  - Matrix A/Alamouti

- ## Open-Loop MIMO for MSs with 2Tx antennas
  - Matrix B vertical/single codeword open-loop MIMO

Collaborative Spatial Multiplexing / Receive Spatial Division Multiple Access

- Multiple users sharing a time-frequency resource on the UL

- Supported in legacy system for up to 2 users

- 16m should support up to four simultaneous layers / streams

  – Four single-antenna MSs

  – Two double-antenna MSs each transmitting Matrix A or Matrix B

  – One double-antenna MSs (Matrix A or Matrix B) with one or two single-antenna MSs

Proposed Table of Contents: UL MIMO Schemes (See C802.16m-08/608 for more details)

- 11.8 – Uplink MIMO Schemes
  - 11.8.1 MS Antenna Configurations Supported for UL-MIMO
    - Mobile Handset/CPE: 1 transmit antenna, 2 receive antennas
    - Switched Diversity MS/CPE: 1 transmit antenna, M receive antennas
    - Mid-Tier CPE: 2 transmit antennas, M receive antennas
    - High-Tier CPE: 4 transmit antennas, M receive antennas (FFS)
  - 11.8.2 Single-user methods
    - SIMO and SIMO with switched TX Diversity
    - Two-antenna Open-Loop STC (Matrix A)
    - Two-antenna Open-Loop MIMO (Matrix B, single codeword)
  - 11.8.3 Multi-user methods (Collaborative Spatial Multiplexing)
    - Up to four single-antenna MSs can be multiplexed in one uplink allocation.
    - Two two-antenna MSs can be multiplexed in one uplink allocation where each two-antenna MS employs two-antenna open-loop STC or two-antenna open-loop single-codeword MIMO.
    - One two-antenna MS and one or two single-antenna MSs and can be multiplexed, where the two-antenna MS employs two-antenna STC or two-antenna open-loop MIMO.