

Multi-Antenna Technology

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Abstract

Multi-antenna technology which utilize multiple antennas at both transmitter and receiver is an attractive solution for the next generation mobile communication systems. While Multiple Input Multiple Output (MIMO) increases the maximum data rate at high signal-to-noise power ratios (SNR), transmit beamforming improves the reception performance at low SNR such as cell-edge. We have been proposing Multi-beam MIMO scheme which can effectively combine MIMO and transmit beamforming using a common set of antenna configuration. Applying Multi-beam MIMO, sufficient throughput performance can be achieved in various propagation condition at entire cell.

Technology

In the proposed Multi-beam MIMO scheme, multiple beams are used at the base station to transmit multiple data-streams. The number of beams and data-streams are adaptively selected at mobile stations, and the selected information is fed back to the base station. MIMO is applied if more than two beams are selected, and transmit beamforming is applied if only one beam is selected. We evaluated the throughput performance of the proposed scheme assuming the various antenna configurations, including cross-polarized and linear array antenna. We also investigated the antenna calibration method suitable for Multi-beam MIMO and proposed a novel codebook design which can eliminate the complex hardware calibrator maintaining sufficient throughput performance. (cf. VTC2007Spring, ICC2007)

Application Examples

- Next generation mobile communication systems
 - 3GPP LTE (Long Term Evolution)
 - IEEE 802.16e (Mobile WiMAX)
 - IMT-Advanced (4G mobile system)

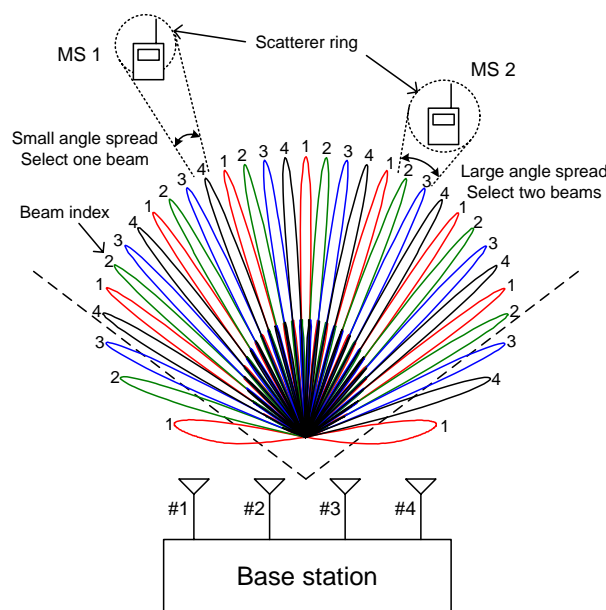


Figure 1. Concept of Multi-Beam MIMO