USAGE THE POLARIZATION ORTHOGONAL DATA CODING IN LTE TECHNOLOGIES WITH MIMO

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The given work is devoted to increase of carrying capacity of LTE channel with MIMO by use the polarization-orthogonal data coding.

We investigate how this depends on the array geometry and the electric field polarization. Moreover, we validate our theoretical predictions with measurements above a nearly perfectly flat surface.

In MIMO systems, a transmitter sends multiple streams by multiple transmit dual polarization antennas. The transmit streams go through a matrix channel which consists of all $2M_t 2N_r$ paths between the M_t transmit dual polarization antennas at the transmitter and N_r receiver antennas at the receiver. Then, the receiver gets the received signal vectors by the multiple receive antennas and decodes the received signal vectors into the original information.

A narrowband flat fading MIMO system is modeled as

$$Y = H \cdot X + n, \quad (1)$$

where – Y and X the receive and transmit vectors, respectively; H and n – the channel matrix and the noise vector, respectively.

Referring to information theory, the ergodic channel capacity of MIMO systems where both the transmitter and the receiver have perfect instantaneous channel state information is

$$C_{perfect-CSI} = E[\max_{Q;tr(Q)\le 1}\left(log_2(det\, I + \rho HQH^H)\right)] = E\left[log_2(det\, I + \rho DSD)\right], \quad (2)$$

where $()^H$ – denotes Hermitian transpose; ρ – the ratio between transmit power and noise power (i.e., transmit SNR).

Computerized results with orthogonal polarization antennae with parameters – angle of orientation – β=70^0 and angle of ellipse α=15^0 and polarization factor m=0.9 were obtained. Here we will show the spatial multiplexing – QPSK and ML receiver (6dB loss) without orthogonal polarization antennae and with orthogonal polarization antennae. We find that BER are close to 0.098 at 10dB SNR and polarization loss energy at 6 dB. We find too, that BER are close to 10^{-5} with orthogonal polarization antennae and without polarization loss energy.

BR computerized results for same conditions were obtained too. Analysis of the graphs are indicates that at SNR 10 dB BR is close to 11Mb/s with polarization losses of energy then BR is equal to 20MB/s without loss of energy by polarization due to use polarization orthogonal antennae.

LTE with MIMO technology and orthogonal polarizing channels additional provides more signal to noise ratio and therefore improves the quality of the channel.