Journal Watch

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- **Adaptive Selection of Antennas for Optimum Transmission in Spatial Modulation**

  Xiping Wu, Member, IEEE, Marco Di Renzo, Senior Member, IEEE, and Harald Haas, Member, IEEE

Aim: Determine the optimal transmit structure, including the no. of antennas and their locations.

System Model:

$$\mathbf{y} = \mathbf{HX} + \mathbf{w}$$
$$\eta_s = log_2(N) + log_2(M)$$

Proposed two-stage approach:

- Find best (M, N) that minimises the ABEP of SM
- Select the specific antennas from the antenna array

$$M_{\text{opt}} = \arg\min_{M} \quad \frac{\overline{B}_{N_t}}{\gamma^{\overline{m}_r N_r}} M^{2\overline{m}_r N_r} + \frac{\overline{C}_{N_t}}{\gamma^{N_r}} \left(2^{\eta_s}\eta_s - M\log_2(M)\right), \quad \text{subject to :} \quad 1 \leq M \leq 2^{\eta_s}$$

$\bar{B}_{N_t}$ and $\bar{C}_{N_t}$: Reflects the effects of fading distribution, channel correlation, method of tx antenna selection.

Contributions:

- Optimised selection of (N, M) for minimised ABEP
- Base station energy consumption based on TOSM

- **Generalized Spatial Modulation in Large-Scale Multiuser MIMO Systems**

  T. Lakshmi Narasimhan, Student Member, IEEE, P. Raviteja, and A.Chockalingam, Senior Member, IEEE

Goal: GSM-MIMO signal detection and channel estimation at the BS.

System model: $\mathbf{y} = \mathbf{H}\mathbf{x} + \mathbf{n}$

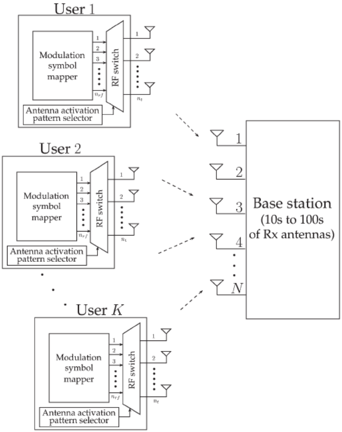
GSM transmitter bpcu :

$\lfloor log_2 \binom{n_t}{n_{rf}} \rfloor + n_{rf} \lfloor log_2 \mid \mathcal{A} \mid \rfloor$

n_t: No. of tr antenna @ UE

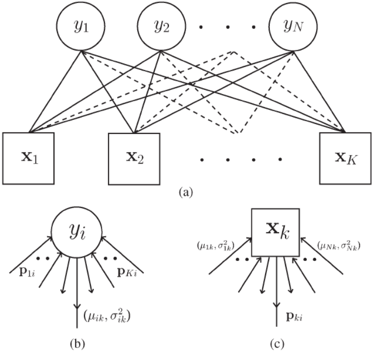
n_{rf}: No. of RF chains @ UE

$\mathcal{A}$: Set of constellation points



Low Complexity Receiver Algorithms:

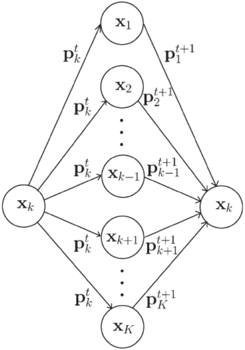
- MP-GSM



$$\mathbf{y} = \mathbf{H}\mathbf{x} + \mathbf{n}$$

$$y_i = \mathbf{h}_{i,[k]}\mathbf{x}_k + \underbrace{\sum_{j=1, j\neq k}^{K} \mathbf{h}_{i,[j]}\mathbf{x}_j + n_i}_{g_{ik} \sim \mathcal{CN}(\mu_{ik}, \sigma^2_{ik})}$$

- CHEMP-GSM



$$\mathbf{H}^H\mathbf{y} = \mathbf{H}^H(\mathbf{H}\mathbf{x} + \mathbf{n})$$

$$\mathbf{z} = \mathbf{J}\mathbf{x} + \mathbf{v}$$

$$\mathbf{z}_k = \mathbf{J}_{kk}\mathbf{x}_k + \underbrace{\sum_{j=1, j\neq k}^{K} \mathbf{J}_{kj}\mathbf{x}_j + \mathbf{v}_k}_{\mathbf{g}_k \sim \mathcal{CN}(\mu_k, \Sigma_k)}$$

Estimation of $H^H H$:

$\mathbf{X}_p = A\mathbf{I}_{Kn_t}$, $\quad A = \sqrt{KE_s}$, $\quad E_s$ is average symbol energy

$$\mathbf{Y}_p = \mathbf{H}\mathbf{X}_p + \mathbf{W}_p = A\mathbf{H}_p + \mathbf{W}_p$$

$$\hat{\mathbf{J}} = \frac{\mathbf{Y}_p^H \mathbf{Y}_p}{NA^2} - \frac{\sigma_v^2}{A^2}\mathbf{I}_{Kn_t}$$

$$\hat{z} = \frac{\mathbf{Y}_p^H \mathbf{y}}{NA}$$

$\mathbf{y}$ is the received signal vector in the data phase.

Contributions:

- Analysis of ABEP for multiuser GSM-MIMO
- Low complexity algorithms for GSM-MIMO signal detection and channel estimation
- Performance in frequncy-selective fading channel

- **Distributed Random Access Scheme for Collision Avoidance in Cellular Device-to-Device Communication**

  Ewaldo Zihan, Student Member, IEEE, Kae Won Choi, Member, IEEE, and Dong In Kim, Senior Member, IEEE

System model:

Network Model

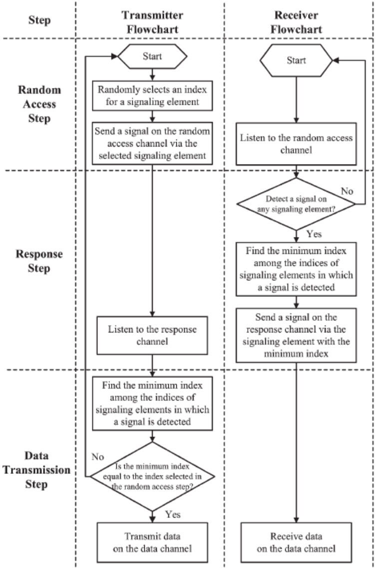
- Separate radio resources for D2D
- Exclusion region for receiver y: $\mathcal{A}(y) = c \mid\mid c - y \mid\leq \gamma$

Time-Frequency Domain Model

Control Channel = M Signaling elements
1 SE = J Resource elements
1 RE consists of one OFDM sub carr during one OFDM symbol interval.

- Locations of the devices: Poisson point process

Proposed Random Access Scheme:



- A stochastic geometry-based approach is used to analyze
- Guarantees that w.h.p. only one tx is allowed to send data through the data channel among all the tx within the exclusion region.

Other papers

- **Resource Partitioning and User Association With Sleep-Mode Base Stations in Heterogeneous Cellular Networks**
  Authors: Chenlong Jia and Teng Joon Lim
- **A Bayesian Approach for Nonlinear Equalization and Signal Detection in Millimeter-Wave Communications**
  Authors: Bin Li, Chenglin Zhao, Mengwei Sun, Haijun Zhang, Zheng Zhou, and Arumugam Nallanathan
- **Energy Efficient COGnitive-MAC for Sensor Networks Under WLAN Co-existence**
  Authors: Ioannis Glaropoulos, Marcello Lagana‘, Viktoria Fodor, and Chiara Petrioli