Journal Watch

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SPC Lab, IISc

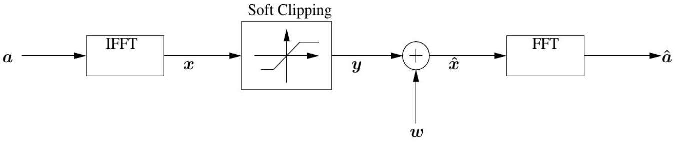
2 June 2012

An Analytical Approach to the Calculation of EVM in clipped Multi-Carrier Signals,

Igal Kotzer, Smadar Har Nevo and Simon Litsyn, Tel Aviv University,

Sasha Sodin, Princeton

- Derived exact expression for EVM due to clipping in Multi-Carrier signals without making any assumptions on the time domain signal (Eg: Gaussian due to CLT)



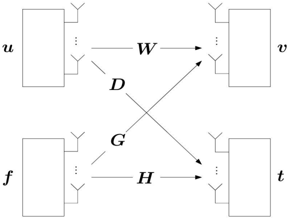
- EVM $\triangleq \sqrt{\frac{\mathbb{E}\{|\widehat{a}-a|^2\}}{N\mathbb{E}\{|a_k|^2\}}}$

$$
\begin{aligned}
\mathbb{E}\{|\widehat{a}-a|^2\} &= \mathbb{E}\{|\widehat{x}-x|^2\}, \quad \text{by Parseval's relation} \\
&= \sum_{n=0}^{N-1} \mathbb{E}\{(x_n - c)_+^2\} + N\sigma_\omega^2 \\
&= N \sum_{q=0}^{\infty} m_q(c) N^{-q}
\end{aligned}
$$

where the coefficient $m_q(c)$ depends on the constellation and the clipping factor c

Uncoordinated Beamforming for Cognitive Networks,

Simon Yiu, Chan-Byoung Chae, Kai Yang, and Doru Calin, Bell Labs



- Adopt beam-forming techniques to suppress interference and maximize sum rate in cognitive networks
- Design beam-formers for a single primary user and a single secondary user.

$$
\begin{aligned}
SINR_P &= \frac{P_P v^H W^H u u^H W v}{P_P v^H G f f^H G^H v + v^H v \sigma_P^2} \\
SINR_C &= \frac{P_C t^H H^H f f^H H t}{P_C t^H D u u^H D^H t + t^H t \sigma_C^2}
\end{aligned}
$$

Optimization problem is

$$\{v_{opt}, f_{opt}, t_{opt}, u_{opt}\} = \arg\max_{v,f,t,u} \{log_2(1 + SINR_P) + log_2(1 + SINR_C)\}$$
$$\text{subject to} \quad \{v^H Gf \ \& \ t^H Du = 0\}$$

Solution

- Search
- Gradient Algorithm
- Closed form solution for $N_r^C = 2$

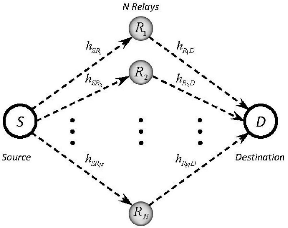
Amplify-and-Forward Relay Selection with Outdated Channel Estimates,

Diomidis S. Michalopoulos, University of British Columbia, Canada,

Himal A. Suraweera, Singapore University of Technology and Design,

George K. Karagiannidis, Aristotle University of Thessaloniki, Greece,

and Robert Schober,University of British Columbia (UBC), Canada



- With perfect CSI, relay selection gives a diversity order of R_N

- Effect of outdated CSI (because of a feedback delay) is studied
- Assumes AR model for channel evolution
- Best relay selection

$$\begin{aligned} \widehat{\gamma}_i &= \min(\widehat{\gamma}_{SR_i}, \widehat{\gamma}_{R_iD}) \\ k &= \arg\max_i \quad \widehat{\gamma}_i \end{aligned}$$

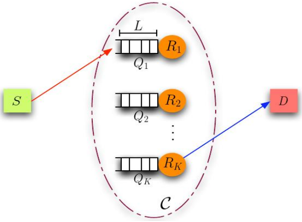
- Partial relay selection with only $S-R$ or $R-D$ CSI
  - $k = \arg\max_i \widehat{\gamma}_{SR_i}$; if S-R CSI is available
  - $k = \arg\max_i \widehat{\gamma}_{R_iD}$; if R-D CSI is available
- Diversity order and the outage performance of AF relay selection is presented
  - $d = N$ if $\rho_1 = \rho_2 = 1$
  - $d = 1$ if $\rho_1 < 1$ or $\rho_2 < 1$

Buffer-Aided Relay Selection for Cooperative Diversity Systems Without Delay Constraints

Ioannis Krikidis, University of Cyprus,

Themistoklis Charalambous, Royal Institute of Technology (KTH), Sweeden,

and John S. Thompson, University of Edinburgh



- Buffer allows max-max relay selection, if there are no delay constraints

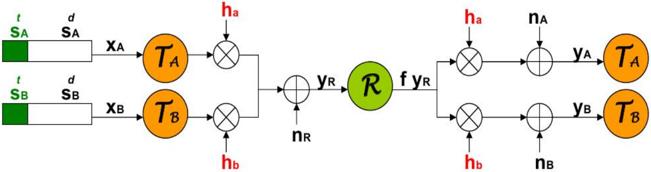
- Max-Max policy is optimal when buffer size is infinite
- Max-link Relay selection decision incorporates the quality of wireless link as well as the status of the finite relay buffer

$$R^* = \arg\max_{R_K \in \mathcal{C}} \left\{ \bigcup_{R_K \in \mathcal{C}, \psi(Q_K) \neq L} |h_{S,R_K}|^2, \bigcup_{R_K \in \mathcal{C}, \psi(Q_K) \neq 0} |h_{R_K,D}|^2 \right\}$$

- Queue is modeled as a Markov chain. Expressions for outage probability is obtained for DF Relay

How Does Channel Estimation Error Affect Average Sum-Rate in Two-Way Amplify-and-Forward Relay Networks?

Azadeh Vosoughi and Yupeng Jia, University of Rochester, NY



- phase 1 $\quad y_R = h_a s_A + h_b s_B + n_R$
- phase 2
  - $y_A = f h_a h_b s_B + f h_a s_A + f h_a n_R + n_A$
  - $y_B = f h_a h_b s_A + f h_b s_B + f h_b n_R + n_B$

- Nodes A and B requires $\widehat{h_a}$ and $\widehat{h_a h_b}$ for self interference cancellation.
- Derived expressions for $CRLB_{h_i}$ and $CRLB_{h_a h_b}$ in terms of $\mathcal{N}_t, \alpha, \mathcal{P}_A, \mathcal{P}_B$ and $\mathcal{P}_R$ and parameters that minimize the CRLB are found
- Optimum power allocation ($\mathcal{P}_A, \mathcal{P}_B$ and $\mathcal{P}_R$) is found out by *pareto-front* optimization
- Derived lower bound for average sum rate