Journal Watch

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Distributed Learning-Based Cross-Layer Technique for Energy-Efficient Multicarrier Dynamic Spectrum Access with Adaptive Power Allocation

Authors: Mahdi Ben Ghorbel, Bechir Hamdaoui, Mohsen Guizani, and Bassem Khalfi.

Goal: To perform joint dynamic spectrum access with adaptive power allocation

Optimization Problem:

$$
\begin{aligned}
&\max_{\{a_i^{(j)}, p_i^j\}} \quad \sum_{i=1}^{n} r_i(t) \\
&s.t. \quad c_1 : \quad \sum_{j=1}^{m} a_i^{(j)} p_i^{(j)} \le P_i^{max}, \quad \forall i \in \mathcal{N} \\
&\qquad c_2 : \quad 0 \le p_i^{(j)} \le P_i^{(j)\max} \quad , \forall i \in \mathcal{N}, j \in \mathcal{M} \\
&\qquad c_3 : \quad 1 \le \sum_{j=1}^{m} a_i^j \le m_i^{max} \quad , \forall i \in \mathcal{N}
\end{aligned} \tag{1}
$$

Disjoint Channel and Power Allocation:

- Learning based channel selection:

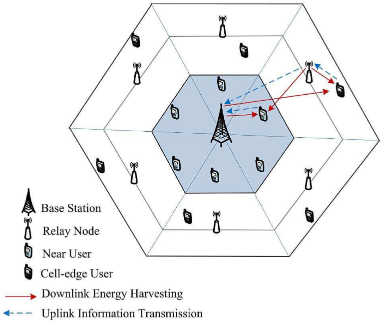
$$Q_i^{(j)}(t) = (1-\alpha)Q_i^{(j)}(t-1) + \alpha g_i(t)$$

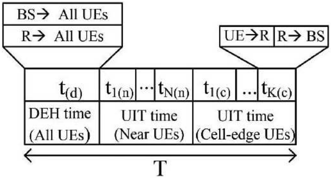
- Power allocation optimization:

Solution obtained using water-filling algorithm

On Multiuser Resource Allocation in Relay-Based Wireless-Powered Uplink Cellular Networks

Authors: Sudha Lohani, Roya Arab Loodariceh, Ekram Hossain, and Vijay K. Bhargava.





Joint Power and Time Allocation: Scenario 1

$$\max_{\{t_{(d)},t_{(n)},P_{(rd)},P_{(ru)}\}} \sum_{i=1}^{N} R_{i(n)} + \sum_{j=1}^{K} R_{j(c)}$$

$$\text{s.t.}\quad c_1 : \quad t_{(d)} + \sum_{i=1}^{N} t_{i(n)} + \sum_{j=1}^{K} t_{j(c)} \leq 1$$

$$c_2 : \quad P_{(rd)} t_{(d)} + \sum_{j=1}^{K} P_{j(ru)} \frac{t_{j(c)}}{2} \leq E_{max}$$

$$c_3 : \quad t_{(d)} \geq 0;\, t_{i(n)} \geq 0, \quad \forall i;\, t_{j(c)} \geq 0, \quad \forall j$$

$$c_4 : \quad P_{(rd)} \geq 0;\, P_{j(ru)} \geq 0, \forall j$$

$$\Downarrow$$

$$P_{(rd)} = P_{j(ru)} = P_R$$

- Solve it iteratively.
  - Time allocation $\Rightarrow$ Solve for power allocation.
  - Power allocation $\Rightarrow$ Solve for time allocation.

Joint User Selection and Feedback Bit Allocation Based on Sparsity Constraint in MIMO Virtual Cellular Networks

Authors:Jung Hoon Lee, Wan Choi, and Huaiyu Dai.

Goal: Achievable sum-rate maximization by jointly considering user selection and feedback bit allocation.

FIGURE – VCN System

Optimization problem for VCN network

$$\max_{\{b_{11},\dots,b_{KN}\},\{S_1,\dots,S_N\}} \sum_{n=1}^{N} \sum_{k\in S_N} \tilde{R}_{kn}(b_{kn}) \qquad (2)$$

$$\begin{aligned} s.t. \quad c_1 &: \quad S_n \subset [K], Card(S_n) = M, \\ c_2 &: \quad Card(s \in S_n | \gamma_{sn} \leq \gamma_{TH}) \leq M^{IN} \\ c_3 &: \quad \sum_{k=1}^{K} b_{kn} = B_n, \quad \forall n \in [N]. \end{aligned}$$

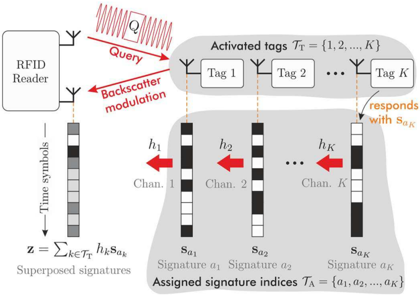
Convex Relaxation

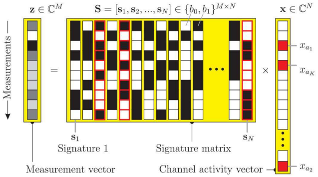
Cardinality constraint $\Rightarrow$ Sparsity constraint

$||b_n||_0 \leq M \Rightarrow ||b_n||_1 \leq \eta$

RFID Tag Acquisition via Compressed Sensing: Fixed vs Random Signature Assignment

Authors: Martin Mayer, and Norbert Goertz





$$\Downarrow$$

$$z = Sx + w$$

- Solved it using Approximate Message Passing (AMP) recovery.
- Length of the signature 'M'

$$M \geq ck \log(\frac{k}{N})$$

- **Fixed Signature Assignment**: Signature assigned uniquely, data-read out is collision free.
- **Random Signature Assignment**: Signature assigned repeatedly, one or more collision(s) in data read-out.