Journal Watch

IEEE Transaction on Wireless Communication
01 October, 2015

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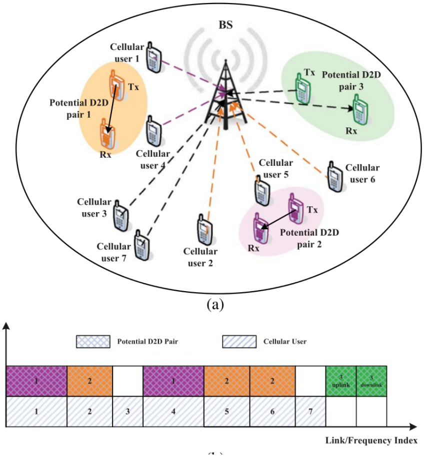
IISc

October 24, 2015

Dynamic Distributed Resource Sharing for Mobile D2D Communications

Dan Wu, Yueming Cai, Rose Qingyang Hu, and Yi Qian



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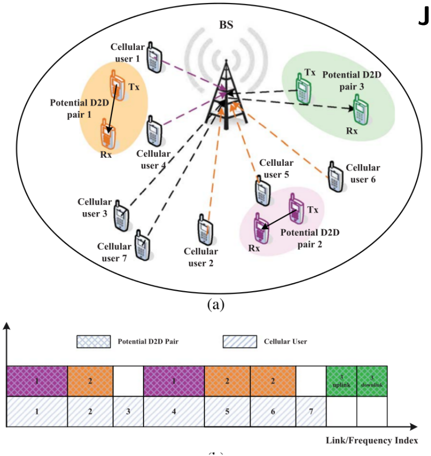

Jointly considers: mode selection, resource allocations and power control.

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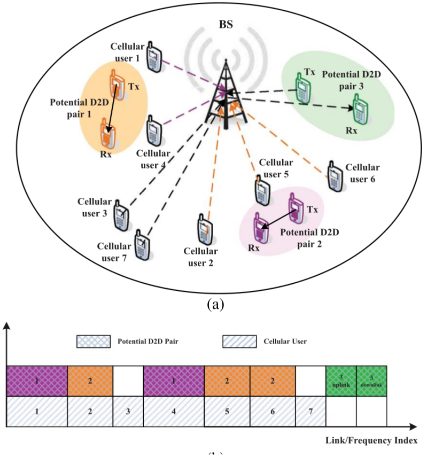

Jointly considers: mode selection, resource allocations and power control.

Hedonic coalition formation

$$\phi_j(S_i) = R_i^j(p_i^j, q_j) + R_j(p_i^j, q_j)$$

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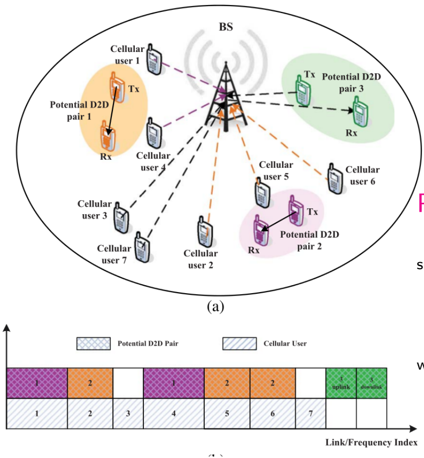


Jointly considers: mode selection, resource allocations and power control.

Hedonic coalition formation

$$\phi_j(S_i) = R_i^j(p_i^j, q_j) + R_j(p_i^j, q_j)$$

Power control optimization problem

$$max_{\mathbf{p}_i, \mathbf{q}_i} \sum_{j \in S_i} \phi_j(S_i)$$

subject to

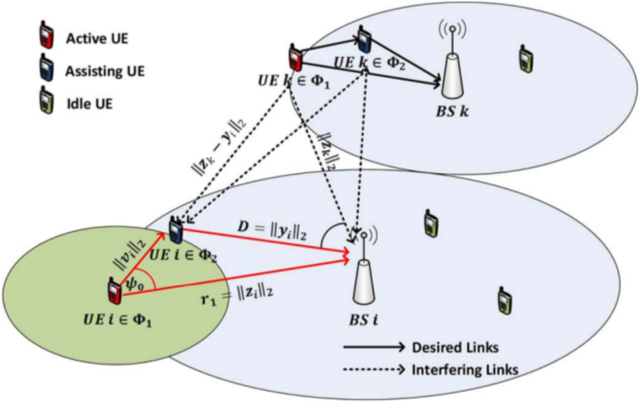
$$R_j(p_i^j, q_j) \geq R_j^{thr}, \quad j \in S_i,$$
$$0 \leq q_j \leq Q_{j,max}, \quad j \in S_i,$$
$$\sum_{j \in S_i} p_i^j \leq P_{i,max}, \quad p_i^j \geq 0, \quad j \in S_i,$$

where $\mathbf{p}_i = \{p_i^j\}_{j \in S_i}$ and $\mathbf{q}_i = \{q_j\}_{j \in S_i}$

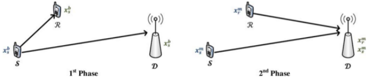
Local piecewise-linear approach

Uplink User-Assisted Relaying in Cellular Networks

Hussain Elkotby, Student Member, IEEE, and Mai Vu, Senior Member, IEEE



PDF scheme



Phase1:

$$Y_r^b = h_{sr} x_s^b + Z_r^b,$$
$$Y_d^b = h_{sd} x_s^b + Z_d^b$$

Phase2:

$$Y_d^m = h_{sd} x_s^m + h_{rd} x_r^m + Z_d^m$$

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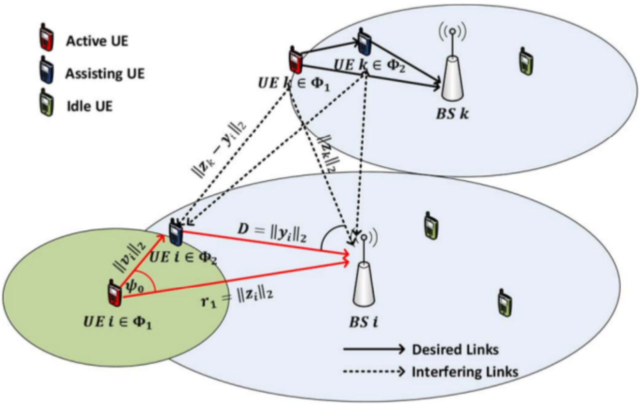


Transmission strategy:

$B_k \sim Bern(\rho)$

$B_k = 0$, Direct transmission

$B_k = 1$, Take help of idle user

Cooperation policies:

$$E_1 = \{|\tilde{h}_{sr}^{(k)}|^2 \geq |\tilde{h}_{sd}^{(k)}|^2\} \cong \{\frac{g_{sr} r_2^{-\alpha}}{Q_{r,k}} \geq \frac{g_{sd} r_1^{-\alpha}}{Q_{d,k}^b}\}$$

$$E_2 = \{r_2 \leq r_1, D \leq r_1\}$$

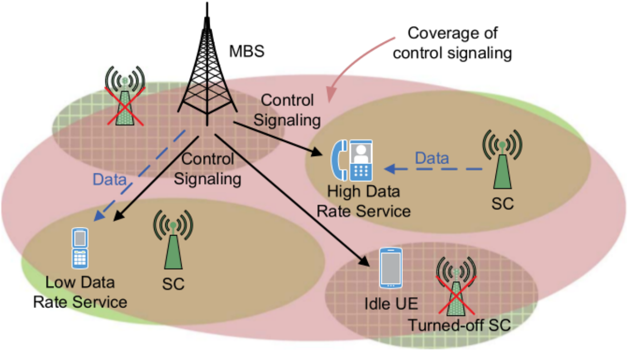
$$E_3 = \{g_{sd} r_1^{-\alpha} \leq g_{sr} r_2^{-\alpha}, D \leq r_1\}$$

- Decision making nodes depends on specific implementation.
- Do not use power control at each user.
- They use second moment matching to model the out-of-cell interference power as a Gamma distribution.

How Many Small Cells Can be Turned Off via Vertical Offloading Under a Separation Architecture?

Shan Zhang, Student Member, IEEE, Jie Gong, Member, IEEE, Sheng Zhou, Member, IEEE, and Zhisheng Niu, Fellow, IEEE

Hyper-cellular network:



MBS: Macro base station

SC: Small cell

MSBs transmit at fix power.

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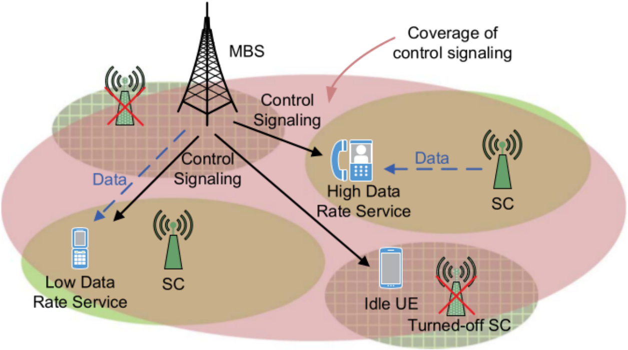
Hyper-cellular network: Channel Borrowing



- Analysed the outage probability.

Random scheme: SCs go into sleep w.p. p_s independently.
Repulsive scheme: SCs within sleeping radius will go to sleep.

How Many Small Cells Can be Turned Off via Vertical Offloading Under a Separation Architecture?

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Random scheme:

$$max_{p_s,p_m} \quad p_s$$

s.t. $$\frac{w_s}{1+\frac{\lambda_s}{\rho_s}} log_2(1+\tau\prime(p_s)) \geq U_s$$
$$\frac{w_m}{1+\frac{3\sqrt{3}}{2}\lambda_m D^2} log_2(1+\tau_m) \geq U_m$$
$$\frac{W_m - w_m}{1+\frac{3\sqrt{3}}{2}\lambda_s p_s p_m D^2} log_2(1+\tau_0(\alpha_m, D)) \geq U_0$$
$$\frac{W_s - w_s}{1+\frac{3\sqrt{3}}{2}\lambda_s p_s (1-p_m) D^2} log_2(1+\tau_0(\alpha_s, D)) \geq U_0$$

$$p_m \quad \in (0,1), \text{ with CB}$$
$$\quad = 1, \text{ without CB}$$

Repulsive scheme:

$$max_{R_s,p_m} \quad \pi R_s^2 \rho_m$$

s.t. $$\frac{w_s}{1+\frac{\lambda_s}{\rho_s}} log_2(1+\tau_s) \geq U_s$$
$$\frac{w_m}{1+\frac{3\sqrt{3}}{2}\lambda_m D^2} log_2(1+\tau_m) \geq U_m$$
$$\frac{W_m - w_m}{\pi R_s^2 \lambda_s p_m} log_2(1+\tau_0(\alpha_m, R_s)) \geq U_0$$
$$\frac{W_s - w_s}{\pi R_s^2 \lambda_s (1-p_m)} log_2(1+\tau_0(\alpha_s, R_s)) \geq U_0$$

Joint Downlink and Uplink Aware Cell Association in HetNets With QoS Provisioning

Hamidreza Boostanimehr and Vijay K. Bhargava, Life Fellow, IEEE

Joint Downlink and Uplink Aware Cell Association in HetNets With QoS Provisioning

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Problem Formulation:

$$\mathbf{P} : max_{\mathbf{x},\mathbf{n}^{DL},\mathbf{n}^{UL}} \sum_{i \in \mathcal{U}} \sum_{j \in \mathcal{B}} x_{ij} \left(w_i^{DL} U_i(\bar{r}_{ij}^{DL}) + w_i^{UL} U_i(\bar{r}_{ij}^{UL}) \right)$$

subject to

$$\begin{aligned}
&C_1 : \textstyle\sum_{i \in \mathcal{U}} x_{ij} n_{ij}^{DL} \leq N_j^{DL}, \quad \forall j \in \mathcal{B}, \\
&C_2 : \textstyle\sum_{i \in \mathcal{U}} x_{ij} n_{ij}^{UL} \leq N_j^{UL}, \quad \forall j \in \mathcal{B}, \\
&C_3 : \textstyle\sum_{j \in \mathcal{B}} x_{ij} \leq 1, \quad \forall i \in \mathcal{U} \\
&C_4 : \textstyle\prod_{j \in \mathcal{B}} (PO_{ij}^{DL})^{x_{ij}} \leq T_i^{DL}, \quad \forall i \in \mathcal{U}, \\
&C_5 : \textstyle\prod_{j \in \mathcal{B}} (PO_{ij}^{UL})^{x_{ij}} \leq T_i^{UL}, \quad \forall i \in \mathcal{U},
\end{aligned}$$

$$\begin{aligned}
&x_{ij} \in \{0, 1\}, \forall (i, j) \in \mathcal{U} \times \mathcal{B}, \\
&n_{ij}^{DL} \in \left\{0, 1, ..., N_j^{DL}\right\}, \forall (i, j) \in \mathcal{U} \times \mathcal{B}, \\
&n_{ij}^{UL} \in \left\{0, 1, ..., N_j^{UL}\right\}, \forall (i, j) \in \mathcal{U} \times \mathcal{B}.
\end{aligned}$$

Joint Downlink and Uplink Aware Cell Association in HetNets With QoS Provisioning

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Base line cell association solution (centralised):

$$\mathbf{P}_x : max_{\mathbf{x}} \sum_{i \in \mathcal{U}} \sum_{j \in \mathcal{B}} x_{ij} a_{ij}$$

subject to

$$\begin{array}{l} \sum_{i \in \mathcal{U}} x_{ij} \bar{n}_{ij}^{DL} \leq N_j^{DL}, \quad \forall j \in \mathcal{B}, \\ \sum_{i \in \mathcal{U}} x_{ij} \bar{n}_{ij}^{UL} \leq N_j^{UL}, \quad \forall j \in \mathcal{B}, \\ \sum_{j \in \mathcal{B}} x_{ij} \leq 1, \quad \forall i \in \mathcal{U} \end{array}$$

$$0 \leq x_{ij} \leq 1, \quad \forall (i,j) \in \mathcal{U} \times \mathcal{B}.$$

where

$$a_{ij} = \left(w_i^{DL} U_i(\bar{r}_{ij}^{DL}) + w_i^{UL} U_i(\bar{r}_{ij}^{UL}) \right)$$

Linear program in $\mathbf{x}$: Simplex method and Rounding the solution

Joint Downlink and Uplink Aware Cell Association in HetNets With QoS Provisioning

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Distributed cell association solution:

- BS need to broadcast quantised interference level.
- Move budget constraints into objective function.
- Lagrange dual function is obtained which can be decoupled w.r.t. users.
- If BSs broadcast their lagrange multipliers also then user can find the best BS for it.
- After the cell association each BS distributes remaining RBs.

Other papers

- Joint Rate and SINR Coverage Analysis for Decoupled Uplink-Downlink Biased Cell Associations in HetNets.
  Sarabjot Singh, Xinchen Zhang, and Jeffrey G. Andrews
- Network Code Division Multiplexing for Wireless Relay Networks.
  Jing Yue, Zihuai Lin, Branka Vucetic, Guoqiang Mao, Ming Xiao, Baoming Bai, and Kun Pang
- Joint Power and Rate Control for Device-to-Device Communications in Cellular Systems.
  Hojin Song, Jong Yeol Ryu, Wan Choi, and Robert Schober
- Energy-Efficient Resource Allocation in Single-Cell OFDMA Systems: Multi-Objective Approach.
  Lukai Xu, Guanding Yu, and Yuhuan Jiang
- Online Resource Allocation for Energy Harvesting Downlink Multiuser Systems: Precoding With Modulation, Coding Rate, and Subchannel Selection.
  Weiliang Zeng, Yahong Rosa Zheng, and Robert Schober