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Joint Beamforming and Resource Allocation for Wireless-Powered Device-to-Device Communications in Cellular Networks

-Meng-Lin Ku and Jyun-Wei Lai

Aim

Maximize the sum rate of the wireless-powered D2D communication by jointly designing beamforming, time allocation and D2D transmit powers, while satisfying both the uplink and downlink QoS of cellular users (CUs)

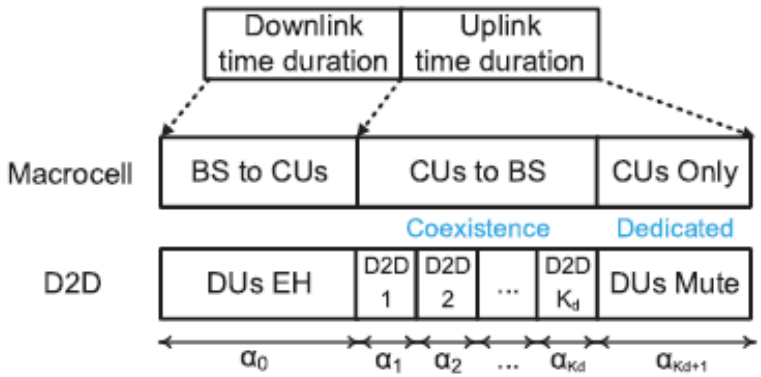

Figure: System model

- Single DU and multiple DU scenarios analyzed
- D2D communications rely on the downlink harvested energy and reuse the cellular uplink spectrum resources for data transmissions
- Downlink subproblem - use semi-definite relaxation approach to find globally optimal transmit beaforming by maximizing DU harvested power
- Upink subproblem - jointly optimize receive beamforming and resource allocation w.r.t given harvested energy

Mobile Unmanned Aerial Vehicales (UAVs) for Energy-Efficient Internet of Things Communications

–Mohammad Mozaffari, Walid Saad, Mehdi Bennis and Merouane Debbah

Contribution

- Jointly optimize the 3D placement and the mobility of UAVs, device-UAV association and the uplink power control

Approach

- Devices transmit their data to UAVs in the uplink using FDMA over R orthogonal channels
- Locations of devices and UAVs are known to the central cloud server
- Analyze the IoT network within a time interval $[0, T]$. At the beginning of each time slot, positions of UAVs and device-UAV association is updated based on locations of currently active devices
- Assign different channels to devices which are located in proximity to each other using K-means clustering strategy
- Solve optimization (transmit power minimization of the IoT devices) problem at each update time, t_n during interval $[0, T]$
- Decomposed into two sub-problems solved iteratively
  - Given UAV locations, find optimal association and device transmit power such that the uplink SINR requirements are satisfied with minimum total transmit power
  - Given the device association, determine sub-optimal locations of UAVs so that total transmit power is minimized

Cache Placement in Fog-RANs: From Centralized to Distributed Algorithms

-Juan Liu, Bo Bai, Jun Zhang and Khaled B. Letaief

Contributions

- Study cache placement problem by using flexible physical layer transmission schemes and diverse content preferences of different users
- Develop both centralized and distributed transmission aware cache placement strategies to minimize users' average download delay s.t. storage capacity constraint

System model

- Each user served by one or multiple BSs
- Each BS is equipped with cache of finite capacity
- Expression for delay varies for non-cooperative transmission (user served by single BS a_m) and cooperative beamforming (user served by multiple BSs)

$$\begin{aligned} \min_{\{x_{nm}\}} D(X) &= \frac{1}{K}\sum_{k=1}^{K}\sum_{n=1}^{N} p_{nk} D_{nk}(X) \\ s.t. \sum_{n=1}^{N} x_{nm} &\leq Q_m, \forall a_m \in \mathcal{A} \\ x_{nm} &\in \{0,1\}, \forall f_n \in \mathcal{F}, a_m \in \mathcal{A} \end{aligned} \tag{1}$$

Other interesting papers

- Juan Liu, Wei Chen, and Khaled B. Letaief, "Delay Optimal Scheduling for ARQ-Aided Power-Constrained Packet Transmission Over Multi-State Fading Channels".
- Ian Flint, Han-Bae Kong, Nicolas Privault, Ping Wang, and Dusit Niyato, "Wireless Energy Harvesting Sensor Networks: Boolean–Poisson Modeling and Analysis".
- Mohsen Saffar, Hamed Kebriaei, and Dusit Niyato, "Pricing and Rate Optimization of Cloud Radio Access Network Using Robust Hierarchical Dynamic Game".
- Xinhua Wang, Ju Liu, and Chao Zhai, "Wireless Power Transfer-Based Multi-Pair Two-Way Relaying With Massive Antennas".