

Homework No. 3

Simulation of DTPC Algorithm

1 Single-Cell Networks

In this homework, apply TPC, OPC and DTPC algorithms to a simple wireless network with 6 users. For the TPC and DTPC, each user has a minimum target-SINR denoted by $\hat{\gamma}_i$, which is assumed to be the same for all users for sake of simplicity. The users should be uniformly distributed in the cell. The following parameters are fixed for both constrained and unconstrained transmit power cases:

- Background noise power $\sigma^2 = 10^{-10}$
- OPC constant $\eta = 10^{-4}$
- Path gain $h_i = 0.09d^{-3}$.

1.1 Unconstrained Transmit Power Case

Simulate the system under a condition that the minimum target-SINRs for all users are feasible assuming no constraint on maximum power.

- Plot the SINR and power of each user versus the number of iterations (a measure of time), for several values of minimum target-SINR.
- Compare and discuss the results in terms of outage ratio and system throughput for the TPC, OPC and DTPC algorithms with the change in minimum target-SINR.
- Do all users obtain a SINR greater than their minimum target-SINR in DTPC? if not, which user(s) obtain a SINR greater than the minimum target-SINR in DTPC?
- Could you modify the unconstrained DTPC so that all users benefit from available resources (i.e., all users obtain a SINR greater than the minimum target-SINR)

1.2 Constrained Transmit Power Case

Now consider a constrained DTPC in which $\bar{p}_i = 1$ mW for all i .

- Repeat the simulation as above.
- Does the constrained DTPC guarantee the minimum target-SINR for all users? why? Discuss and try to find a solution to resolve the problem.

Please note that you should upload your HW in a zipped folder named 'HW5 your student number'. This folder must include 1- your code files (ending in .m) and 2- your report file containing your plots and answers to different parts of HW.