APPLICATION OF MASSIVE MIMO IN COGNITIVE SYSTEMS

Abstract:

We try to use the massive no of antennas at cognitive base stations (BS) in reducing the interference caused to the primary users (PUs) under incomplete /imperfect channel state information(CSI) without deteriorating the efficiency of the cognitive users(CUs).we try to simulate the complement of interference outage probability at the cognitive systems and without knowing the channel spectrum information we try to reduce the interference probability of the cognitive systems on the primary users without reducing the efficiency of cognitive users by the use of massive MIMO.

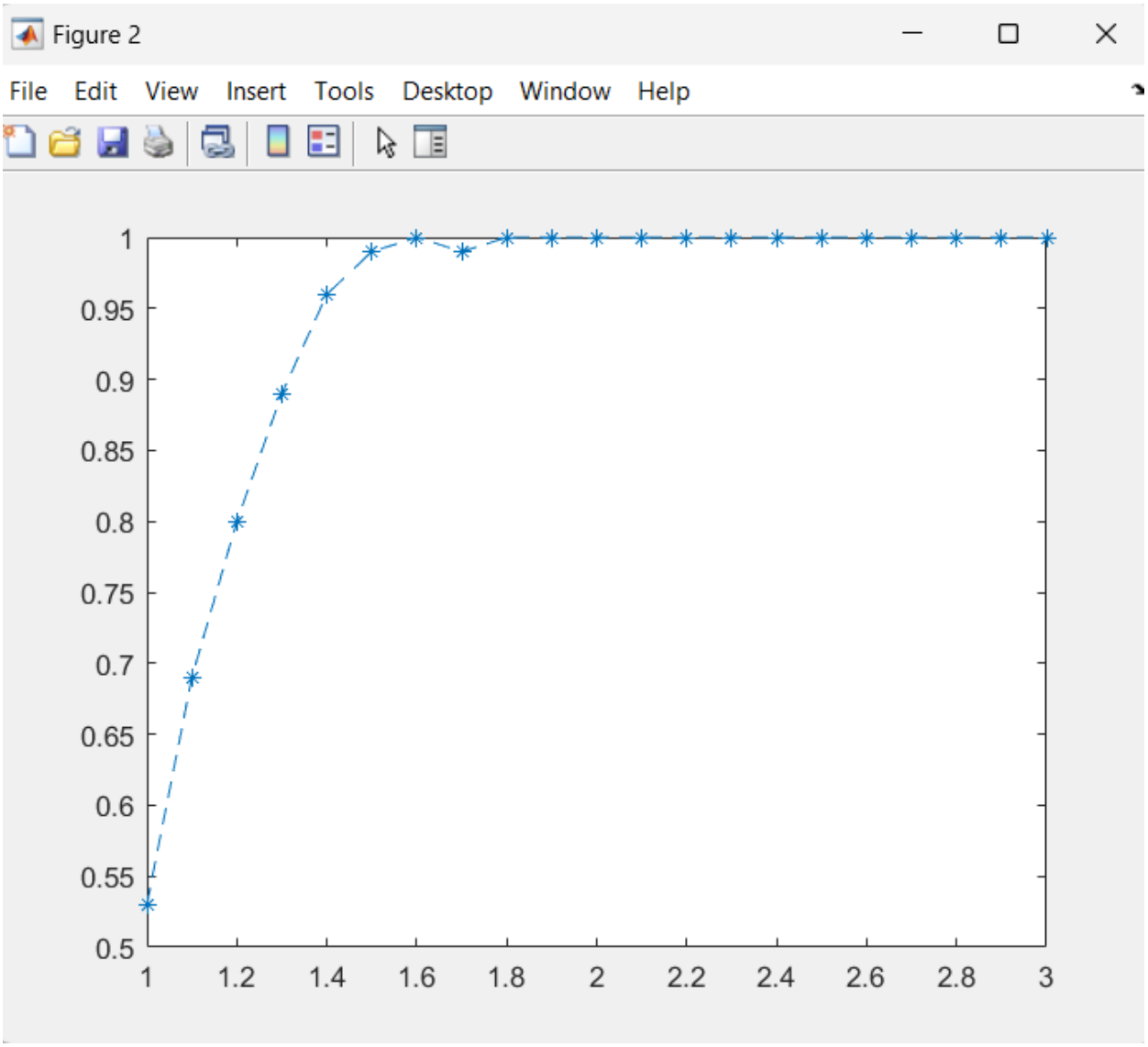
INTRODUCTION:

The next generation wireless systems must be designed with high data rates and efficient connectivity to multiple devices like IoT devices. Along with data rate we are concerned about the available wireless spectrum. Most of the spectrum below 6Ghz is already occupied by the 2g-4g and Wi-Fi services. This is the reason why spectrum regulatory authorities are allowing concurrent sharing of spectrum to the unlicensed cognitive users in order to boost the spectrum utilization efficiency. The cognitive users(CUs) can coexist with the licensed primary users in using spectrum.

Due to lack of channel state information (CSI), There should be interference between the primary users and cognitive base stations(CBs) and to avoid this the interference power of the cognitive base station should be below an acceptable threshold. But by reducing the power at cognitive base station can avoid interference but it reduces the efficiency of the system. To avoid this situation, we use massive

MIMO systems at the cognitive base stations which take less power and has high directivity and high beamforming gain. So we can restrict the interference power below the threshold. In this project we can reduce the power generated by the cognitive base station using backoff factor (eta) and try to plot the graph between backoff factor and the compliment interference constraint probability. The interference constraint probability try to tell the probability of inference caused by the cognitive base station(CBs) to the primary users(PUs).In the MATLAB code we try to take the parameters like channel information vectors , all types of power between the stations and users and the backoff factor(eta) and run the simulation and plot the graph.

Simulation result:



Conclusion:

- We considered a massive MIMO based spectrum access network in which cognitive base station(CB) has an imperfect channel estimates its channels to the Kth antenna of primary user(PUs) and employs maximum ratio beamformer to transmit under interference outage portability constraint. We developed a backoff factor (eta) based power control policies at cognitive base station(CBs) which makes sure that the interference power does not exceed interference threshold not more than interference outage probability. The new analytical expression that is complement of interference outage probability constraint which estimate an approximate value for backoff factor(eta). Based on backoff factor we try to reduce the power generated by cognitive base station and hence derive new expression for sum spectrum efficiency of cognitive users for each value .So from the the plot we can say that as the back off factor (eta) increases from 1 to 3

respective complement values of interference outage probability reaches to 1 hence the cognitive base user(CBs) can use the spectrum as effective as licensed primary users(PUs) with out causing any interference to primary users(Pus).