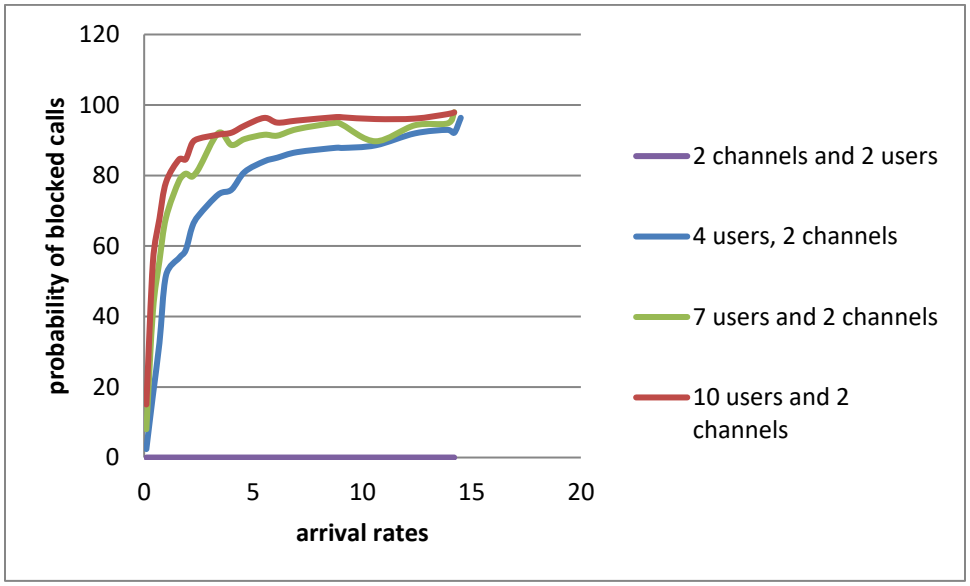
Simulation of Fixed Channel Assignment in Cellular Networks

Simulation measurements:

- There is "**N**" number of full-duplex channels available in a given cell in the cellular network.
- At a given time, up to (and including) **N** different voice calls (users) can be serviced by the system and the (**N+1**) the call (user) will be rejected (blocked).
- Calls arrival is Poisson process.
- Service time (call duration) is exponential distribution.
- Simulation time: **3000**
- Arrival rate: varies between **(0.1-14.5)**. It is common for all users in the system.
- Service rate: **1**

Simulation Results:



Note: Detailed results are in sheet1.xlsx

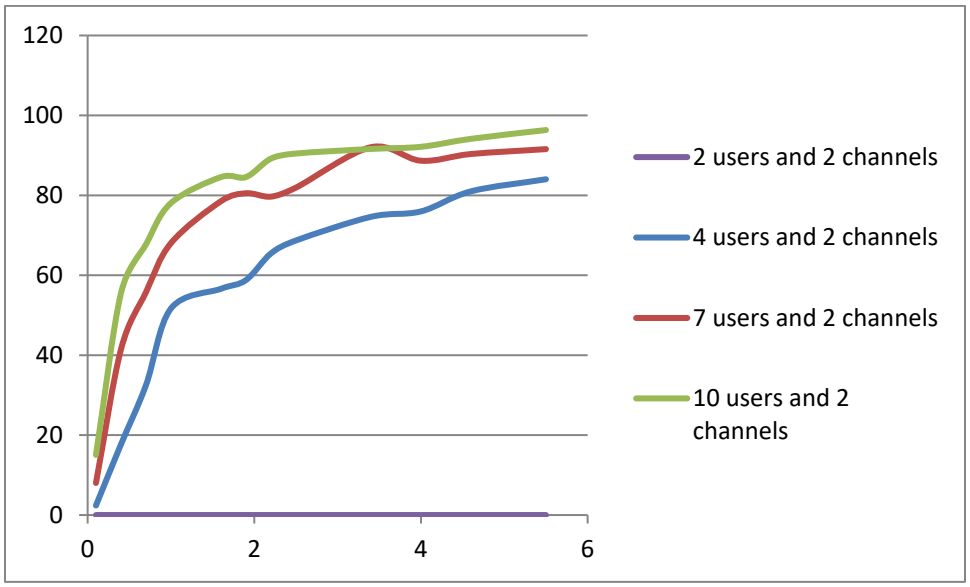
We can notice the following:

- For a system with a fixed number of channels, as the number of users increases, the probability of blocked calls will increase as will.

- As the arrival rate increases, the number of blocked calls increases as well. The increase will be high at the beginning then it will saturate.

- When the number of users in the system equals the number of channels in the system, the probability of blocked calls will be zero.

The following diagram is the same as the above one, but for a small rage of arrival rates (0.1-5.5), just to show the difference when the number of users changes.

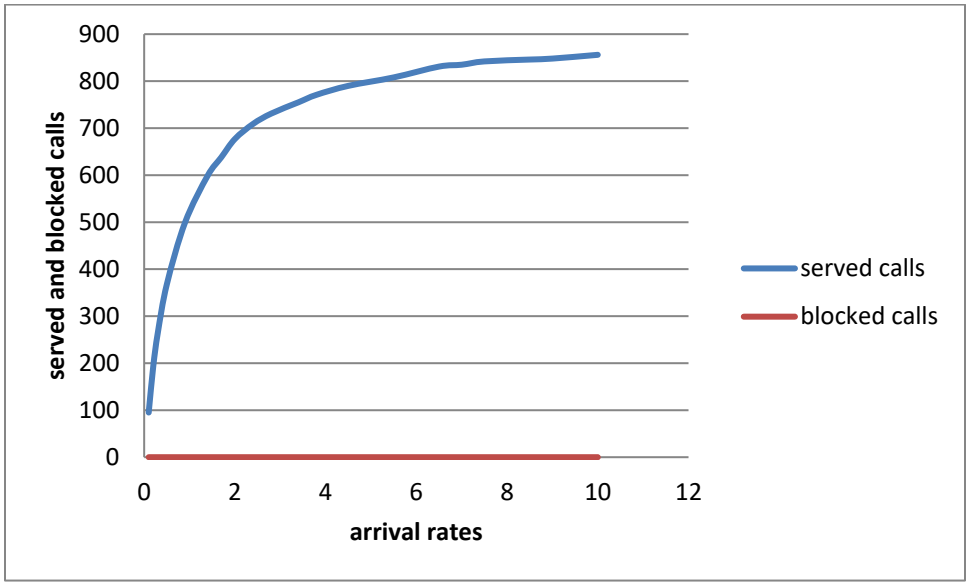


Following are some other tests done:

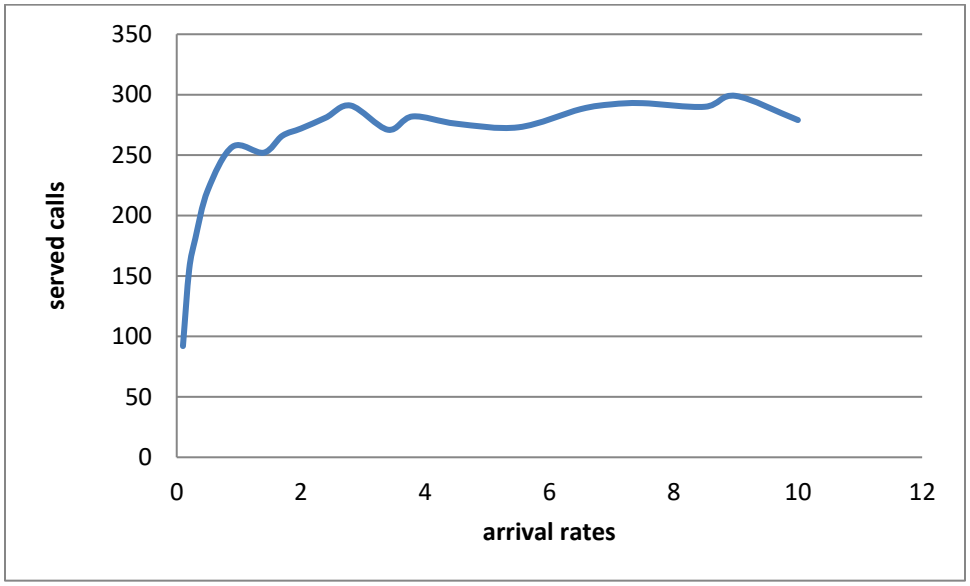
Notes:

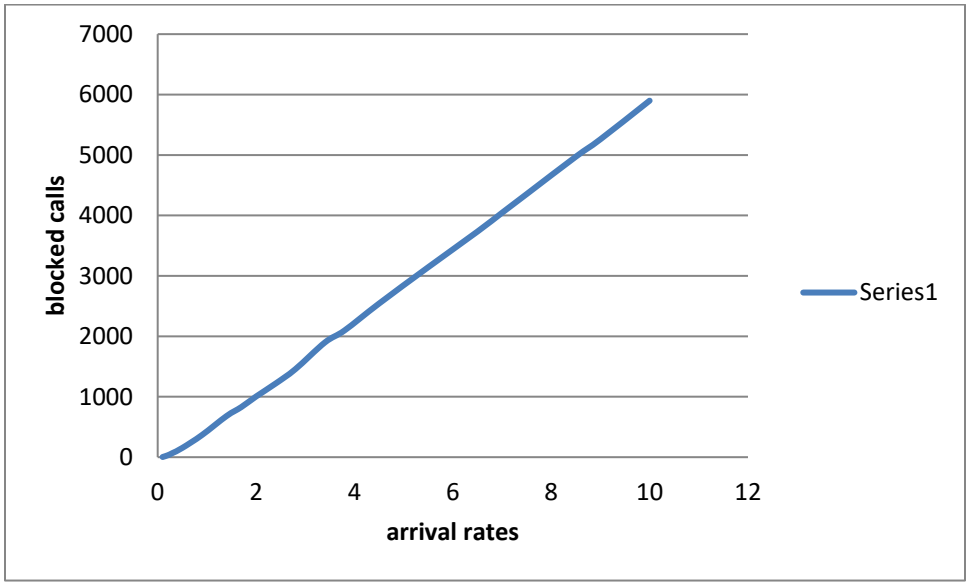
- Detailed results are in sheet2.xlsx file:
- Arrival rate varies between (0.1-10)

4 users and 4 channels with service rate 0.8:



4 users and 2 channels with service rate 0.5





In the following test, the arrival rate is fixed, and the service rate is changed:

Note: details are in sheet3.xlsx file