

Experiment No. 07

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AIM:

To understand the cellular frequency reuse concept to find the co-channel cells for a particular cell.

THEORY:

In mobile communication systems a slot of a carrier frequency / code in a carrier frequency is a radio resource unit. This radio resource unit is assigned to a user in order to support a call/ session. The number of available such radio resources at a base station thus determines the number of users who can be supported in the call. Since in wireless channels a signal is "broadcast" i.e. received by all entities therefore once a resource is allocated to a user it cannot be re assigned until the user finished the call/ session. Thus the number of users who can be supported in a wireless system is highly limited. In order to support a large no. of users within a limited spectrum in a region the concept of frequency reuse is used. The signal radiated from the transmitter antenna gets attenuated with increasing distance. At a certain distance the signal strength falls below the noise threshold and is no longer identifiable. In this region when the signal attenuates below the noise floor the same radio resource may be used by another transmission to send different information. In terms of cellular systems, the same radio resource (frequency) can be used by two base stations which are sufficiently spaced apart. In this way the same frequency gets reused in a layer- geographic area by two or more different base stations with different users simultaneously. Now what is important is to select the set of base stations which will use the same set of radio resources/ channel of frequencies or technically the co- channel cells. In this context the minimum adjacent set cells which use different frequencies each is called a cluster. The cellular concept is the major solution of the problem of spectral congestion and user capacity. Cellular radio relies on an intelligent allocation and channel reuse throughout a large geographical coverage region.

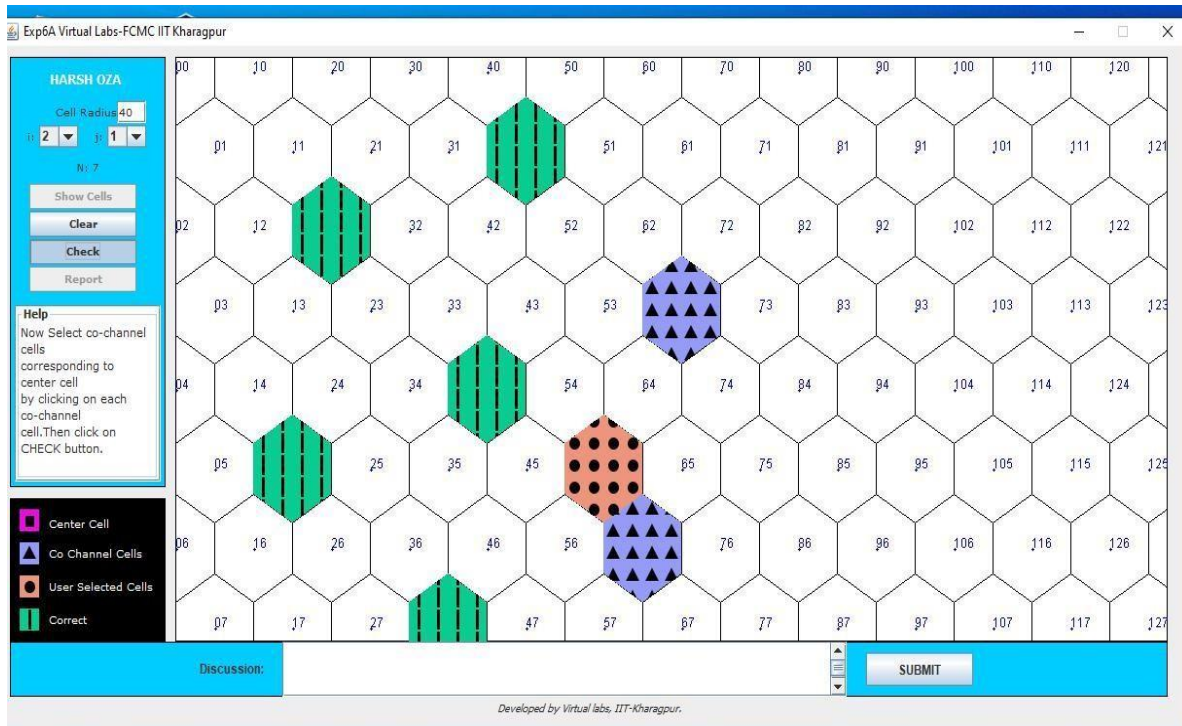
Cellular frequency reuse

Each cellular base station is allocated a group of radio channels to be used within a small geographic area called a cell. Base stations in adjacent cells are assigned channel groups which contain completely different channels than neighboring cells. Base station antennas are designed to achieve the desired coverage within a particular cell. By limiting the coverage area within the boundaries of a cell, the same group of channels may be used to cover different cells that are separated from one another by geographic distances large enough to keep interference levels within tolerable limits. The design process of selecting and allocating channel groups for all cellular base stations within a system is called frequency reuse or frequency planning.

Output:

($N=7, i=2, j=1$)

Fading Channels & Mobile Communications



CONCLUSION:

From this experiment we learnt about cellular frequency reuse concept. This concept is used to find the cell-clusters within a certain geographical area and the co-channel cells for a particular cell. In this experiment we found the co-channel cells for a particular cell with using, IIT Kharagpur Virtual Labs.