Using SciLab Improvement of Channel Capacity with Cell Splitting

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Abstract: *Cell splitting in mobile communication is the process in which the bigger cells split up into smaller ones. In mobile communication we use cell splitting so that we can expand the capacity of the system. Cell splitting also helps to increase the number of channels. Whenever there is a bigger network for any area, the number of mobile users also increases. This system can be implemented using MATLAB software. But MATLAB software requires licence. In this paper, cell splitting is implemented using Scilab software. Scilab is an open-source software and therefore cell splitting implemented using Scilab.*

Keywords: *Scilab, Frequency Reuse, Cell Splitting, Cell*

I. INTRODUCTION

Scilab is an engineering tool which is capable of numerical computations, data analysis and plotting, system modeling and simulation, and offers application designing with the help of GUI (Graphical User Interface), embedding Scilab in C/C++. Basically, Scilab is an interpreted language. This generally allows to get faster development processes, because the user directly accesses to a high-level language, with a huge set of features provided by the library. Users can design their own module to solve particular problems. Scilab can also interface LabVIEW, which is a visual programming language from National Instruments.

II. LITERATURE SURVEY

Almost all cellular mobile communications of today take place in sub 3 GHz band that has now become too crowded to support future demands of increasing mobile data traffic. Therefore, a new paradigm has been explored for designing next generation cellular communication system (i.e. 5G) using 28 GHz and 39 GHz millimetres wave (mmW) frequency bands [1]. As the number of users in a cellular system increases, the traffic per unit time also increases. The allocated spectrum becomes gradually congested and eventually becomes used up. Congestion of the spectrum means that the call blocking probability has increased and this is not desired in the system. This paper presents cell splitting as a technique of improving channel capacity in cellular communication system. It also went further to show that increase in channel capacity directly reduces call blocking probability and call delay probability. The results are simulated and shown using MATLAB.[2]

III.ANALYSIS

The developments in wireless communication networks over the past couple of decades have been enormous and havebecome universal in modern days. It is commonly assumed that the next generation of wireless communication networks will be heterogeneous, with different types of wireless network and technologies co-existing.

Cell splitting is the process of subdividing a congested cell into smaller cells, each with its own base station and a corresponding reduction in antenna height and transmitter power. Cell splitting increases the capacity of a cellular system since it increases the number of times that channels are reused.

Shrinking of the cell size in cellular network to increase spectral efficiency by using spectral multiplexing techniques like massive MIMO. Cellular structure is used in mobile network to implement the concept of frequency reuse where adjacent cells (or small geographical areas) are assigned different sets of frequencies to increase network capacity.
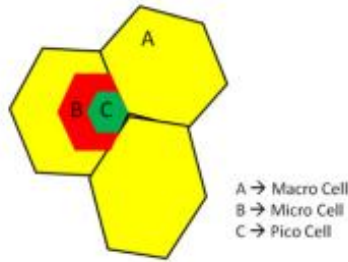
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Figure 1: Concept of Cell Splitting

There are three kinds of cells namely –
- Macro cell serving upto 30Kms of geographical area
- Micro cell serving upto 2Kms geographical area
- Pico cell serving about 200 m

IV. SCILAB CODE

```
clc;clear all;
M=input("enter the number of cluster: ");
k-input("enter the Number of channels per cells:
N=input("enter the number of cells in a cluster");
a = input("enter the Number of mini cells per Macro cells: ");
b= input("enter the Number of Micro cells per Mini cells: ");
y= k*M*N*a;
disp('Channel Capacity considering Minicells:');
disp (y);
Z=y*b;
disp('Channel Capacity considering Microcells:');
disp(z);
```
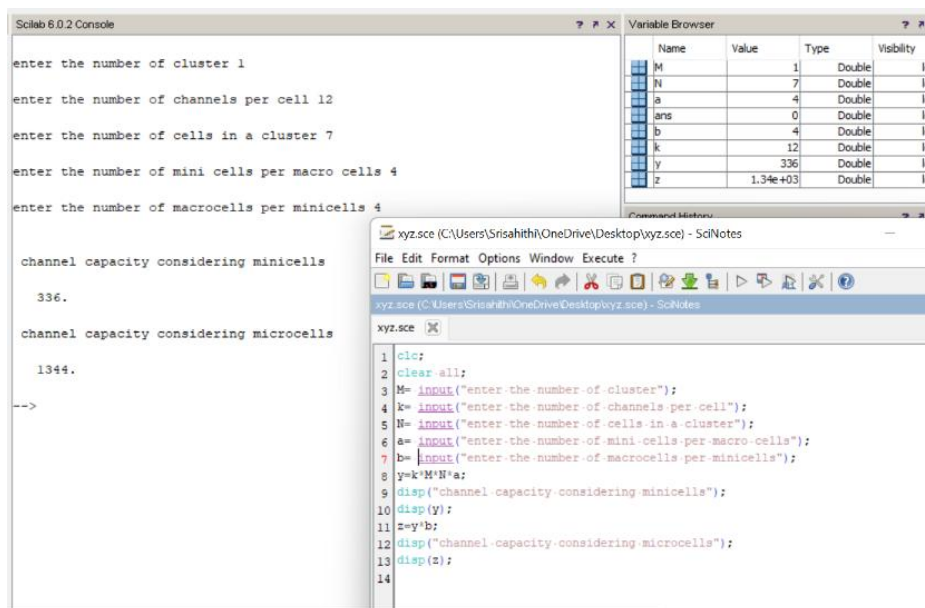

Figure 2: ScilabCode and Result

IV.CONCLUSION

In conclusion, using open-source software scilab for cell splitting, the capacity of a cellular communication system can be increased. The increment in channel capacity after cell splitting helps to reduce the call blocking. probability and call delay or queuing probability. The results show that when properly and orderly carried out, the cell splitting technique has the capability of increasing the capacity of a congested cellular system.

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