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Using Renewable Energy Sources for Power Saving: Home appliances and femtocells

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Abstract

Although femtocells were used to improve network coverage, recently it has been used for power saving purposes as well. Femtocells can be powered through renewable energy sources which in turn optimizes energy consumption in the home appliances. The use of femtocells can reduce costs and improve the network coverage further. We provide an overview of green cellular networks and how it addresses energy savings. The advantages of using renewable energy sources and Femto cells for energy conservation are the discussed. This paper discusses how to use renewable energy source for powering Femto cells which in turn is sustainable. In future, it can be deployed in other African countries. Here MATLAB is used as a trademark, software and energy consumptions are plotted over costs in different test beds. We observed that the power consumption becomes less due to the cost of maintenance and it remains constant at a certain price. Our results indicate reductions in energy consumptions through the use of femtocells and the home appliances that were powered by renewable energies.

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1. Introduction

The demand for Internet service and other Information and communication technologies (ICTs) has significantly increased along with the increase in energy consumption and the use of the cloud. The growth in energy consumption and the costs have, however, motivated the development of a research study on reduction of energy

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consumed by the use of the computer servers [1]. The energy consumption and the appliances in the home need to be considered.

Femtocell has become an important technology for communication in the indoor environment and can assist to access data. This increased the need for storage equipment, networking infrastructures and use of various ICTs including the cloud. It is also an auto configuration and self-optimization designed for the network through the Internet. Figure 1 shows some home appliances as controlled by femtocells.

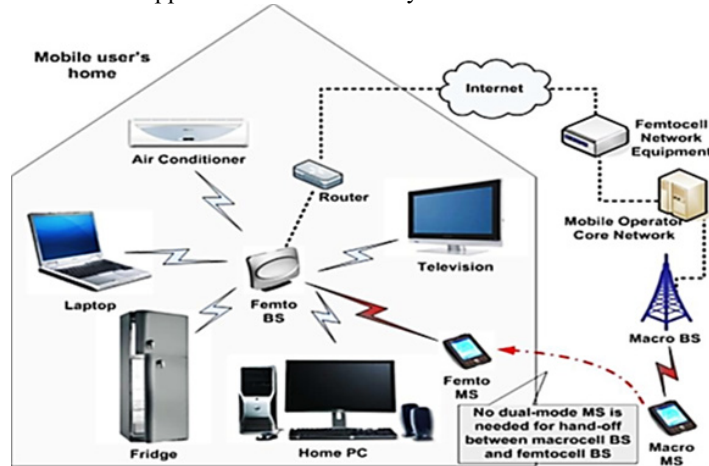


Fig. 1. Home appliances and femtocells [2]

It offers a viable approach in meeting the capacity demands of new mobile service for several reasons such as cheap, no rental costs, simplified network planning and less cost of upkeep. Moreover, by using the renewable energy source, it will sustain low-power base station to the user and reduce carbon emission in the surroundings. However, renewable energy sources are still unexploited in today's networks and home because they haven't been economically feasible so far.

The estimated mobile energy consumption is 0.5% [3], and there is a trend of the increase due to new technology. The Do Communication over the Mobile Network (DoCoMo) in Japan [4], estimates 70-85% of energy consumption rate at the base station, and this will raise the increase in the operational cost of the mobile provider. Hence, cutting the energy cost is essential for the sustainability of the home user for the purpose of appliances and network. But much work has to be put into account by the researcher to integrate the available renewable energy into the cellular network, especially for household use. Our main focus is to provide a sustainable energy cost to pilot the power saving of home appliance and home base station in an indoor environment.

In this paper, we provide a sustainable energy cost to the powered home appliance through a renewable source that can be deployed in African countries in the future. The results showed significant cost reduction and power saving when they were powered by renewable energies. The solar energy source is considered as the renewable energy source, which depends on the sunlight, geolocation of the panel.

2. Green cellular networks

There was a study done by the GSM Association (GSMA) to provide an energy source for the cellular network, where it powers the home base station and home appliance to resolve the high consumption of energy problems from the power grids. This action would save the global diesel consumption. The study of green energy for the mobile network has set a motion by the GSM Association (GSMA) to help the mobile provider to employ different types of RE sources for powering their Base Station such as the Macrocell site, femtocell and other home appliances [6]. This would save almost 0.55% of diesel consumption globally. In [7], the authors look at the potential use of RE source in bringing down the operational cost of the mobile cellular networks. Their survey indicates that it is wise and environmentally friendly to use Resources for operating both micro- and small- cell BSs. It can also serve long as the

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