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Mobile Users in South Asian Developing Countries and Femto Technology

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Abstract: ***The study was conducted at University of Gujrat during 2015 with an objective to review the features of Femto technology that would address the question "is Femtocell a good choice for South Asian developing countries?" In this study the feasibility of using Femtocell in South Asian developing countries is highlighted. The practical disadvantages of using Femtocell in under-developing countries are also discussed. The licensed frequency spectrum operation of the said cell restricts the user to utilize various cellular companies' network simultaneously. Moreover, Femtocell depends upon Digital Subscriber Line (DSL) and both operate with electric power. South Asian countries are already facing power deficiency that results the availability of electricity at very high cost. The Universal Femtocell that woks on the whole frequency spectrum from GSM 800 to GSM 2100 is the theoretical solution for the said problem proposed in this study.***

INTRODUCTION

The current age is considered a digital era due to innovative electronic technologies that have made data transaction at faster rate with better quality of service (QOS), enhanced signal strength and high bandwidth conservation with minimal power consumption (Bare, 2012). The cellular communication network is one of the best examples of the electronic technologies that is capturing the digital market very rapidly (Ravishankar, 2013 and Borgaonkar, 2013). Due to the reasons the cell phone users are in billions and are growing with clock (Elleithy et al., 2011).

Earlier, It was believed, that, at least one macro base station is essential for mobile communication in respective area but as the number of mobile phone users has increased exponentially day by day (Bare, 2012) , installation of Femto and pico cells in populous areas has also considered vital. Femto is a small cellular base station that connect broadband router to carrier's cellular network, thereby, transferring and receiving all data via VOIP (voice over internet protocol) (Borgaonkar, 2013). Femtocells are advanced innovative technologies that provide an efficient solution in terms of QOS, bandwidth conservation, signal strength and data traffic by sharing the load of macro cells (Priebe, 2012). Once Femto-cell is installed in desired zone, the entire data include voice, text and media messages etc, are transferred by it instead of Base Transceiver Station (BTS) or Macro-cell of that region. (Elleithy et al., 2011) report that the Femto-Cells not only support to faster data networks like; Third Generation (3G), Long Term Evolution (LTE) and Universal Mobile Telecommunications System (UMTS) but also to the High Speed Packet Access (HSPA) Code Division Multiple Access (CDMA) and Worldwide Interoperability for Microwave Access (WiMAX). These characters have brought Femtocells a desirable commodity among cell phone users.

The objective of this study is to review the features of Femto technology that would address the question "is Femto a good choice for South Asian developing countries?"

The Femtocells are smaller in size (Chowdhury, 2010) that would be much smaller than micro cells which could cover about 12.5km^2 or nano cells and even pico cells (Kumar et al., 2011). It covers an average of 20m^2 radius, thus can be considered as a hotspot (Priebe, 2012). It is the best for indoor use like; home, restaurants, offices etc. and equally good for small outdoor premises like; parks (Gorlatova, 2011). Thus it is also called a home placed based station (HPBS) (Chowdhury, 2010).

User's electricity connection is required to operate the Femto-cells (Kumar et al., 2011) that may be a serious constrain for South Asian underdeveloped countries which are facing serious power crisis.

Femto-cell operates on licensed spectrum (Bare, 2012 and Chowdhury, 2010). This makes it somewhat less desirable in South Asian underdeveloped or developing countries. These factors are well discussed in this study.

MATERIAL AND METHODS

The data regarding cellular users and service providers was collected from various available published hard or soft materials like books, journals and periodic. The data was implemented of the South Asian Countries with special emphasis on Pakistan.

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RESULT, DISCUSSION AND RECOMMENDATIONS

All paragraphs must be indented as well as justified, i.e. both left-justified and right-justified.

As technology trend is more towards provision of better facilities to end users. Numbers of cellular service providers are increasing day by day. Different cellular companies are providing services in different countries. Companies have huge competition for quality services at lesser rates. In this race the companies mostly introduce various packages to convince their customers. On the other hand the customers mostly have more than one Subscriber's Identification Modules (SIM) to get maximum benefits from companies. This trend made the mobile phone manufactures to introduce multiple SIMs supporting phones. Today dual SIMs md quad SIMs cellular phones are available in the market. In this way the customer is connected with more than one cellular service. It is also observed that with in a family cellular phone subscribers are from various companies. The licensed frequency spectrum operation of the Femtocell restricts the user to utilize various cellular companies' network simultaneously. Keeping in view the savor of the subscribers, Femtocell services are not successful in the South Asian countries. For best utilization of Femto technology, an universal Femto that operates on all frequency bands from GSM 900 to GSM 2100 may be used. In Pakistan several mobile companies are operating in GSM 900 to GSM 2100 frequency band. Like Ufone, Warid Telecom, Mobilink and CM Pak (Zong). Following is the frequency allocation in different GSM bands of said companies;

900: (Uplink)

2.5 (NA)	7.6 (Z)	4.8 (M)	7.6 (U)	4.8 (T)	7.6 (W)

880 882.5 890.1 894.9 902.5 907.3 914.9 (MHz)

(Downlink)

2.5 (NA)	7.6 (Z)	4.8 (M)	7.6 (U)	4.8 (T)	7.6 (W)

925 927.5 935.1 939.9 947.5 952.3 959.9 (MHz)

1800: (Uplink)

8.8 (W)	6 (U)	8.8 (T)	6 (M)	16.2 (Z)	29.1 (NA)

1710.1 1718.9 1724.9 1733.7 1739.7 1755.9 1785 (MHz)

(Downlink)

8.8 (W)	6 (U)	8.8 (T)	6 (M)	16.2 (Z)	29.1 (NA)

1805.1 1813.9 1819.9 1828.7 1834.7 1850.9 1880(MHz)

2100: (Uplink)

10 (Z)	5 (T)	5 (U)	10 (M)	30 (NA)

1920 1930 1935 1940 1950 1980 (MHz)

(Downlink)

10 (Z)	5 (T)	5 (U)	10 (M)	30 (NA)

2110 2120 2125 2130 2140 2170 (MHz)

Where; M = Mobilink; T = Telenor; U = Ufone; W = Warid, Z = Zong (CM Pak) and NA=Not Allocated and the frequency bands are obtained from web site (http://www.spectrummonitoring.com/frequen).

Similarly in Bangladesh the presence of seven various mobile companies like Airtel, Banglalink, Citycell, Grameenphone, Robi, Teletalk and Worldtel make the completion more tough. In Afghanistan six different companies are working that include Afghan Telecom,

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AWCC, Etisalat, Roshan, MTN and Wasel. In Srilanka five mobile phone service providers are working; Bharti Airtel, Dialog, Etisalat, Hutch and Mobitel. In Nepal five different companies are working between 824 to 2170MHz frequencies spectra. In the prevailing situation the users like to have more than one cellular company from of variety of companies, Femtocells fails to provide different cellular services simultaneously. Thus Femtocells are less desirable for people of South Asia because they all are using different cellular services thus require different Femtounits installed and licensed to respective company frequency spectrum.

For this there must be a unit called Universal Femtocell that will work on whole frequency spectrum. There should be a variable frequency oscillator in Femtocell that will produce required frequency whenever required.

Moreover, Femtocell depends upon Digital Subscriber Line (DSL) and both operate with electric power. South Asian countries are already facing power deficiency that results the availability of electricity at very high cost. The Universal Femtocell that woks on the whole frequency spectrum from GSM 800 to GSM 2100 is the theoretical solution for the said problem proposed in this study.

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