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"Design of Efficient Mobile Femtocell by Compression and Aggregation Technology in Cellular Network "

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Abstract-*To enhance the QoS it is essential to working on new technology which improve the network coverage to provide undisturbed services. Our main focus is to improve the QoS with improvement in Delay, Throughput and consumption of Energy with the lossless LZMA data compression technique which decreases the transmitting time of data. Femtocell network provide the solution for better coverage within indoor coverage and data compression provide it to sharp nose.*
Keywords : LZMA, Femtocell, Delay, Throughput, Energy.

I. Introduction-Technology is essential element for humans after cloths, shelter and food. The improvement in each and every part of technology is need of today's era. According to current survey occupy 78% all mobile traffic used only by 13 % smart phone user and the only 20% data usage seems to occur outdoor and 80% data to be in indoor [1]. In 2019, 13% of SIM enabled devices will be LTE and these will generate 79% of mobile data traffic. The growth in average mobile data usage on handset will settle to 30% per year in developed and developing country [2]. In telecom, the small cell play a crucial role to solve the network problems. Femtocell work as a small cell with a coverage range some meters and operate minimum power consumption. Femtocell provide a improvement in HO. The use of Data Compression Technology in Femtocell will improve the operational time and the efficiency of cellular network. LZMA is use for data Compression. The results of comparison of compress and uncompress data provide a better solution for improvement in Throughput, Delay and consumption of Energy.

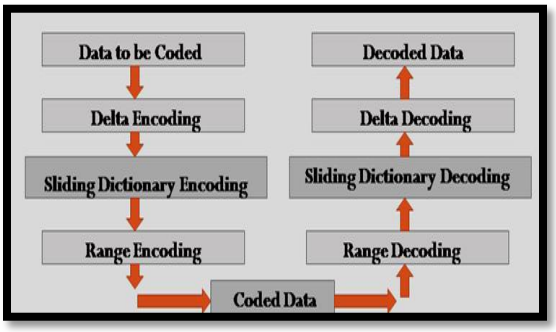
II. LZMA Data Compression Technique

The Data compression technique decrease bits of data results that the decrease in size of data [3] in a frame but the function of the data will not change and the required space for storage of data is also decreases less time to transfer the data. we can say that it is a method to sort the duplicity and to eliminate it .There are two symbolic ways used for the development of this data compression and they are :

Lossless Data Compression
Lossy Data Compression.

In Lossless data compression the data is commonly minify but its integrity idle for long time, after compression only squeeze in the size [4]. Lossless data compression is used in text file, medical images and in database tables because of law of regulations. On another hand Lossy Compression data is decreasing by scratch out certain amount of information that causes repetition, when data is uncompressed a part of the data always still there [5] it is used where perfect texture of the original data is not required. Picture and video data are some examples of Lossy Compression. The dictionary based LZMA algorithm codes byte sequences from earlier contents rather than the original data. In this only one coding scheme is available in which all data will follow same format :

- Provide address to already coded contents
- Obtained sequence length
- Create first deviating symbol



If there is no identical byte sequence is available from earlier contents, address is 0 then sequence length is 0 and the latest symbol will be coded. Figure 1. LZMA also uses Delta Filter and Range Encoder in addition to the LZ77 algorithm[6].

A. Delta Encoding and Decoding

The task of Delta Filter is that it shapes the input data bits for effective compression by the sliding window. It stores or transmits data in the form of sequential data . The output of the first byte delta encoding is data stream. The subsequent bytes are secure as the alternative of its previous and current byte. For a continuously changing real time data delta encoding make the sliding dictionary more efficient [7,8].

B. Sliding Dictionary Algorithm

There are two types of dictionaries first is static dictionary in which the entries are predefined and constant according to the application of the text. Second is adaptive dictionary in which the entries are taken from the text itself and created on-the-fly. A role buffer is as dictionary and the size of these buffers calculate on the basis parameters of the implementation. Patterns in text are complete to born within range of the search buffer. The offset and length are encoded separately, and a bit-mask is also encoded. Purpose of suitable data structure for the buffers will trim the search time for longest match. Sliding Dictionary encoding is more difficult comparatively decoding as it needs to search the longest match [9].

C. Range Coder

Range encoder encodes all the symbols of the message into a single number to achieve greater compression ratios because of the time limit to performing the operation is shrink. The range encoder works on the following steps.

Provide a large enough range of integers and probability evaluation for the symbols.

Divide the initial range into sub-ranges whose size are symmetrical to the probability of the symbol.

Encode each symbol of the message by trimming the current range slide to just that sub-range which corresponds to the next symbol to be encoded. The decoder and encoder must have the same probability estimation, copied from already transferred data [10].

III. Femtocell

Femto-base stations received a lot of attenuation from mobile operators, because they offload the macro network but still use the orthodox types of mobile air interface (GSM, W-CDMA, CDMA). Therefore, the end user can still use existing handsets and enjoy next generation service at the highest bandwidth [11-12-13]. The macro network is a key concern for operators keeping indoor user off, and a differentiator for femto. Because indoors users are behind wall with high attenuation (typically 10-20dB)[14-15].

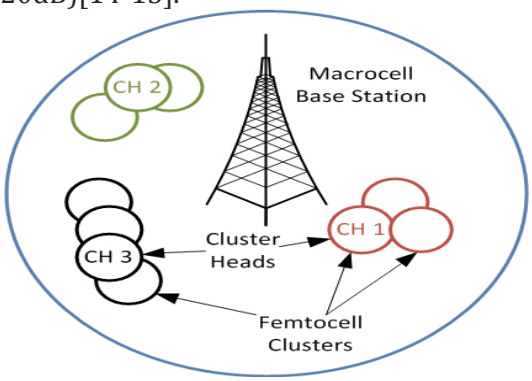


Fig : Clustered femtocell network

They consume more power from the terminal and the base station, and reduces the overall macrocell capacity and coverage. Covering indoor users with femtocell base stations have two advantages, not only

does it provide better coverage and superior network for indoor user, but it free up macrocell resources to serve healthy network for outdoor users [16]. According network type, handover can be categorized in two types. Internetwork handover is occurred between different systems of network, such as handover between LTE and UMTS. Inner network handover is triggered by inner network such as handover in same system [17]. The improvement in handover scenario save the energy of user's devices.

IV. Result and Analysis

In this paper, the efficeient femtocell network achieve on the performance of parameter matrics like delay, energy, and throughput. To obtain the best result here we take five number of communications and find the average values of delay in transmission in data, energy consumption in operation and throughput values.

The results shown the improvement in delay, energy and throughput. The throughput remains same in both condition compress and uncompress data.

Improvement in delay shows that the transmission speed of data is better in compress data when it use in femtocell network.

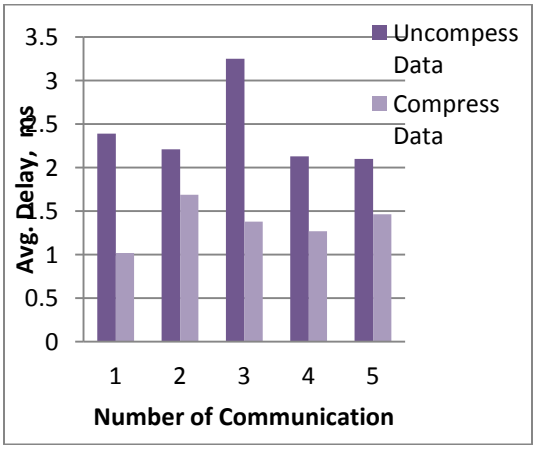


Fig 1 : Avg. Delay Vs. Number of Comm.

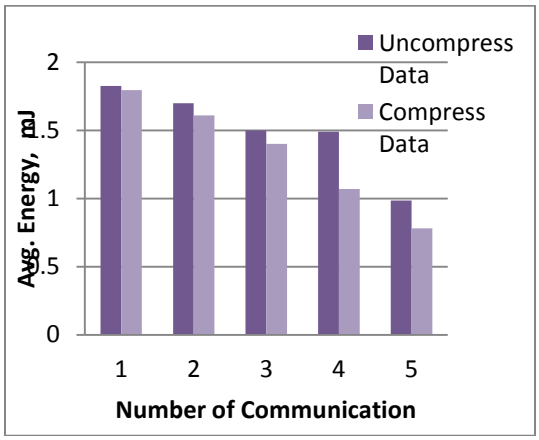


Fig 2 : Avg. Energy Vs. Number of Comm.

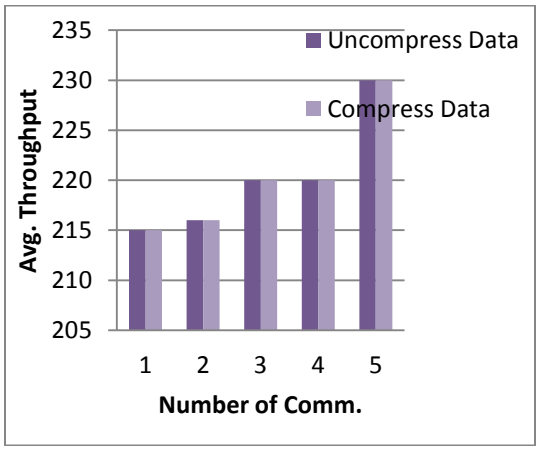


Fig 3 : Avg. Throughput Vs. Number of Comm.

The femtocell provide a option for better coverage and reduces the radiations using the self organizing network scheme's. But use of compress data in transmission of data in femtocell network will improve the parameters like Energy, Delay, and Throughput. In this paper as comparing the compress and uncompress data in femtocell network, compress data provide improved energy consumption, minimum time for transmission of data, and throughput has its optimum values mostly with reduction in data loss. The result provide a efficientmobile femtocell by compression and aggregation technology in cellular network.

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