Efficient Bandwidth Allocation using Lateration Techniques for OFDM Networks

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Abstract: Orthogonal Frequency Division Multiplexing (OFDM) is one of the modulation techniques for mobile networks, because of its good spectral efficiency, bandwidth flexibility, and tolerance to impairments. Considering the planning problem of an OFDM mobile network for bandwidth allocations, the demanded broadcasting rates of the connections are to be afforded. Connections are linked for their demanded rate by alloting spectrum and service space using a variable number of OFDM subcarriers and choosing an appropriate modulation level is also has to be considered. Therefore in this project the Lateration technique has been used for the even bandwidth allocation depends on the each requested mobile nodes. By executing this technique to the OFDM base station the bandwidth can efficiently utilized and hence the bandwidth allocation is purely frequency dependent.

Keywords: OFDM, Lateration Technique, Basestation, MIMO, Bandwidth, collision.

I. INTRODUCTION

Generally in Multiple Input Multiple Output (MIMO) technology, the efficient bandwidth utilization is one of major concerns of mobile communication and its results major obstacles of deployment of Multiple Input Multiple Output. In Multiple Input Multiple Output (MIMO) technology, due to node colliding frequency and categorization in wireless nodes, delay tolerance and data rate will affect the efficiency of the mobile communication system. Therefore this paper is used to contribute for the efficient spectrum utilization.

OFDM: Orthogonal Frequency Division Multiplexing is a form of signal modulation that divides a high data rate modulating stream placing them onto many slowly modulated narrowband close- spaced subcarriers.

The frequency selective fading is low. OFDM splits low data streams into high data streams over n number of subcarrier by introducing guard time intersymbol interference (ISI) has been eliminated and intercarrier interference (ICI) has been eliminated by cycling extension. From DAB Digital Radio to the Digital Video Broadcast standards, DVB, Orthogonal frequency division multiplexing it also incorporated for a many broadcast standards. It is integrated with other broadcast techniques as well as including Digital Radio Mondiale used for the long medium and short medium bands. OFDM is more complex than earlier forms of signal. It has many advantages in terms of data transmission technique.

The Orthogonal Frequency Division Multiplexing (OFDM) transmission technique modulation scheme is the optimal version of the multicarrier transmission scheme. By implementing the concept of parallel data transmission and frequency multiplexing was published in 60s. After many research and development, OFDM modulation technique is also wires high data rates in high speed digital communications. Due to recent advances of digital signal Processing (DSP) and Very Large Scale Integrated circuit (VLSI) technologies, the major obstacles of OFDM implementation such as massive exist anymore. By using of Fast Fourier Transform (FFT) algorithms eliminates arrays of sinusoidal generators and coherent demodulation required in parallel data systems and makes the implementation of the technology cost effective The OFDM concept is based on spreading the data to be transmitted a maximum number of subcarriers, each and every subcarrier of phase and amplitude has been modulated of every subcarrier.

All subcarrier is to be orthogonal to each other by appropriately choosing the frequency spacing between the subcarrier. In orthogonal Frequency Division Multiplexing, the frequency overlapping among numbers of sub-carriers are allowed in OFDM since orthogonality will guarantee the subcarrier division at the receiver, providing high spectral efficiency and the use of steep bandpass filter was unconcerned. OFDM transmission system present possibilities for alleviate many of the problems

encountered with single carrier systems. It has the benefit of scattering out a frequency selective fade over number of symbols.

Therefore the OFDM system community with the 4G technology by implementing the Lateration Technique (LT) to the OFDM basestation the bandwidth allocation can be depends upon each requested mobile node. Hence the entire bandwidth allocation can be done by the OFDM base station

II. SYSTEM MODEL

In this project the Lateration Technique is used for the allocation of the spectrum in the wireless communication. Therefore the complete Bandwidth allocation can be done the base station (BS) and its system model can be given below

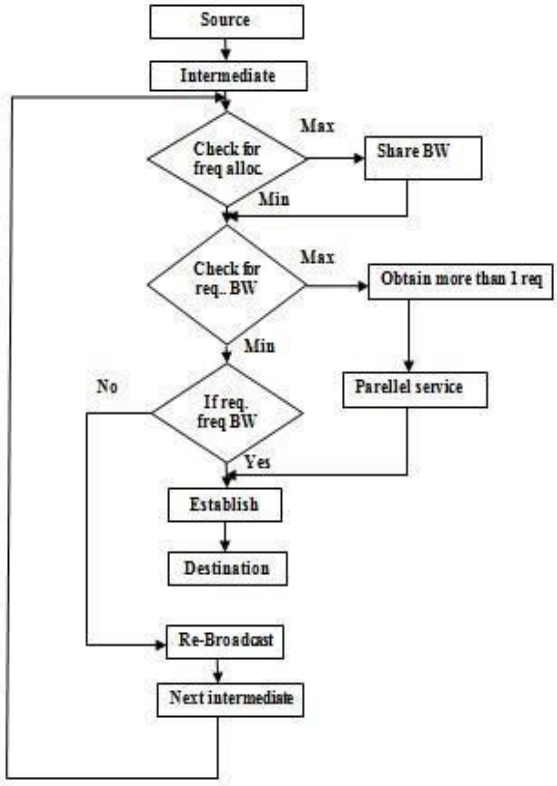

Fig 1. Lateration Technique

Therefore the flowchart of the lateration technique is shown in the figure 1. As shown in the figure the function of the source to the destination can shown in the figure 1. By using this lateration technique to the OFDM Base station for the efficient spectrum allocation. The requirement of each requested mobile nodes of the system the bandwidth allocation can be allocated. Hence the entire bandwidth allocation scheme can be done by the OFDM system Base station.

LT Technique:

As shown in the figure 1, From the source the data can be send through the intermediate node of the system and its the process of checking frequency can be took places, and hence if the demanded frequency is maximum the bandwidth can be shared. If the Demanded frequency is minimum check for the required frequency allocation and therefore if the demanded frequency is maximum more than one user can be obtained. If the necessary frequency is obtained the connection will be established to the destination.

Suppose if the required frequency is low the connection will be re-broadcasted and its links to the next intermediate node and the retransmission process will be took place in the system.

III. PREVIOUS WORK

In previous work the framework for efficient allocation of periodic feedback channels to the nodes of a wireless network. Therefore the various optimization problems are defined and efficient algorithms for solving them are presented. A scheme for deciding when the BS should invoke each algorithm is also proposed and shown through simulations to perform very well [1].

When Multiple Input Multiple Output (MIMO) technology is incorporated into 4G wireless networks, the amount of feedback channel bandwidth that must be transmitted from the MSs to the BS increases dramatically. In the MIMO closed-loop spatial multiplexing mode, for example, this feedback includes the Channel Quality Indicator (CQI) [1].

The BS uses the PMI reports to determine how the precoding matrix should be configured for transmission. The Rank Indicator it gives the information about the number of MIMO transmission layers available to the reporting MS. Therefore this feedback channel consumes much of uplink bandwidth therefore it results to major obstacles of deployment of Multiple input multiple output (MIMO) and other advanced closed-loop wireless technologies. Therefore, the uplink bandwidth for feedback

channels can be allocated very carefully. Our framework includes all common indicators, including CQI is measured for the entire downlink channel bandwidth, or subband CQI, where each CQI is measured over a subband. We do not distinguish between the various indicators and view them collectively as CSI (Channel Status Information) channels. The technique 3GPP/LTE and WiMax/802.16 support periodic and aperiodic CSI feedback. Here we implemented the algorithm called channel status information (CSI) algorithm and hence the bandwidth can be allocated in the form of tree [1]. As shown in the figure 2, in the bandwidth allocation has been maintained in the form of tree and hence the complete bandwidth allocation scheme is entirely depend upon the base station only[1].

CHANNEL STATUS INFORMATION:

The algorithm called channel status information (CSI) which provides the total channel status of the communication system. This channel status information algorithm can be invoked to the base station therefore the base station allocates the bandwidth to the corresponding communication nodes. In this project, the complete bandwidth allocation can be done in the form of tree as shown in the figure 2 [1].

DISADVANTAGE OF CSI:

- Generally in Mobile Communication each mobile station sends a lot of feedback to the base station. Therefore this feedback consumes much of uplink bandwidth and it results to the major obstacle to the deployment of MIMO.
- The base station always needs to update Channel Quality Indicator (CQI).
- This will increase the delay in the packet transmission.
- While forming the CSI Trees if the nodes increases means the tree will become complex
- When using this algorithm in OFDMA system, the Throughput will increase, but the packet transmission rate and accuracy will be reduced.

CSI TREE ALLOCATION FRAMEWORK:

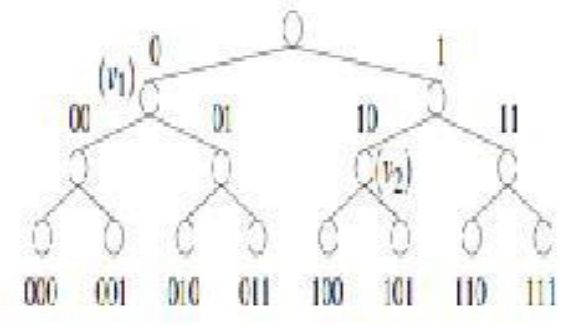

Fig. 2. An example of a labeled CSI allocation tree for a super-channel

As shown in the figure the bandwidth can be maintained as tree. Therefore the binary value shows that the frames transmitting from source to destination [1].

FLOWCHART:

As shown in the figure the entire bandwidth allocation can be done by the base station. Here the proposed algorithm is namely algorithm1 and algorithm2.

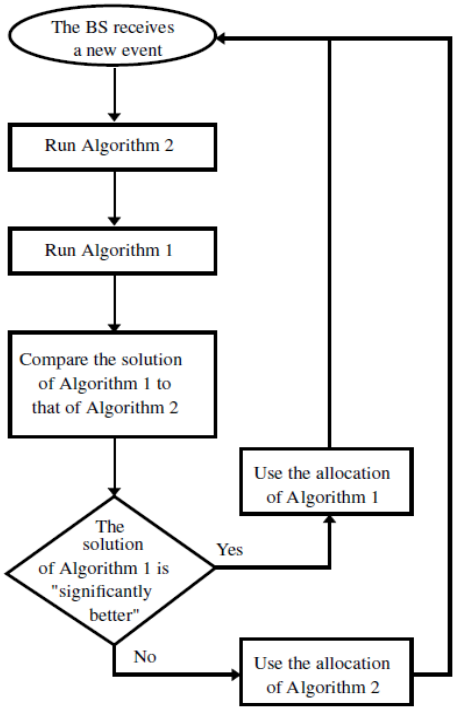

Fig. 3 The complete BS scheme (scheme 1)

Therefore the algorithm1 refers to the new tree and algorithm2 refers to the current tree. Hence in this project we

fixed the threshold value for the tree is equal to greater than 1. If the tree is below the threshold value that tree will be eliminated and the new tree will be formed. As shown in the figure the base station checks the threshold value of the current tree. If current tree is below the threshold value the base station selects the new tree which is above the threshold value greater than 1 [1].

By using channel status information algorithm the maximum throughput will be achieved but the processing delay will be occurred. It will affect the overall performance of the system.

By implementing this algorithm to the OFDM base station, it will delay tolerance flow rate will retarded the system to certain extend. To overcome this drawback , we introducing algorithm called lateration technique algorithm to the orthogonal frequency division multiplexing(OFDM) base station.

As shown in the figure the entire bandwidth allocation can be done by the base station. Here the base station comparing the threshold value current tree and new tree the maximum threshold value has been selected by the base station.

IV. PROPOSED METHODOLOGY

In our proposed work due to the colliding node frequency delay tolerance and data flow rate will affect the overall performance of the system therefore it leads to the major abstacles of deployment of MIMO. To overcome this factors we have proposed a algorithm called lateration technique.

By implementing this lateration technique to the OFDM Base station the bandwidth can be efficiently utilized. According to the corresponding node request the bandwidth allocation can be done. Here the complete bandwidth allocation can done by the OFDM base station and it's purely frequency dependent.

The base station allocates the bandwidth to the maximum bandwidth user therefore that can be referred as the primary user. From the primary user the bandwidth can be shared to other mobile user according to the requested data rate of the system therefore the bandwidth allocation can be done by the OFDM base station in the form of the maximum to the minimum bandwidth user of the system .

In order to achieve maximum throughput this lateration technique has been used. By using this technique the overall profit of the system will be increased.

V. SIMULATION RESULTS

By implementing this Lateration Technique to OFDM basestation the following has been simulated by Network simulator and the parameters are Delay, profit of the system, Average number of changes, throughput are simulated.

The figure 4 shows the delay of the system and it shows the number of transmissions for given data form source to destination. Hence the delay can be calculated by the formula Transmission delay + Retransmission delay. If the number of transmission increases therefore the delay will be increases. As shown in figure 4 comparing to existing method by using the lateration technique to the OFDM basestation the delay will be reduced. As shown in the figure 4 it shows the delay for the Number of transmissions. Therefore if the number of transmission increases the delay will also increases.

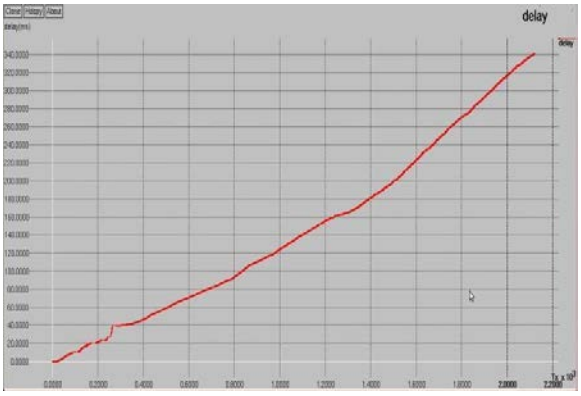

Fig. 4 Delay vs Number of transmissions

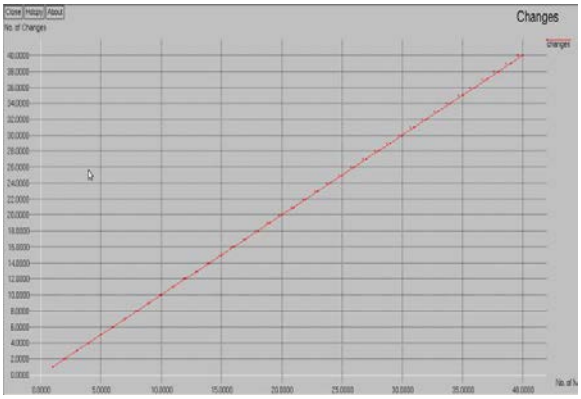

Fig. 5 Average no of changes vs Average no of mobile users

As shown in the figure 5, it includes the Number of routing and visited node (with repetition) from source to destination for a given amount of data in a given time of the system.

As shown in the figure 5, the number of repetitions is low from source to destination.

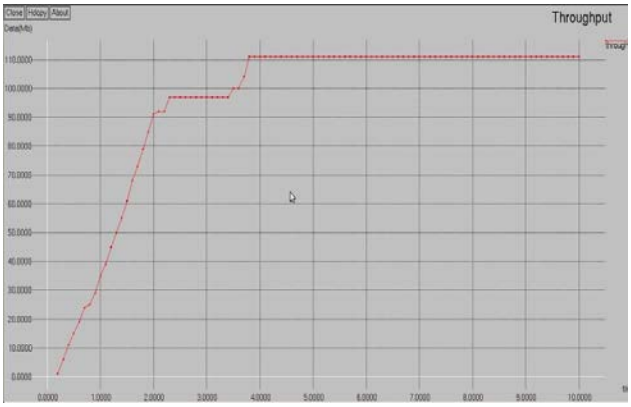

Fig. 6 Throughput vs Time

As shown in the figure 6 it shows the maximum amount of the data is received for the given time.

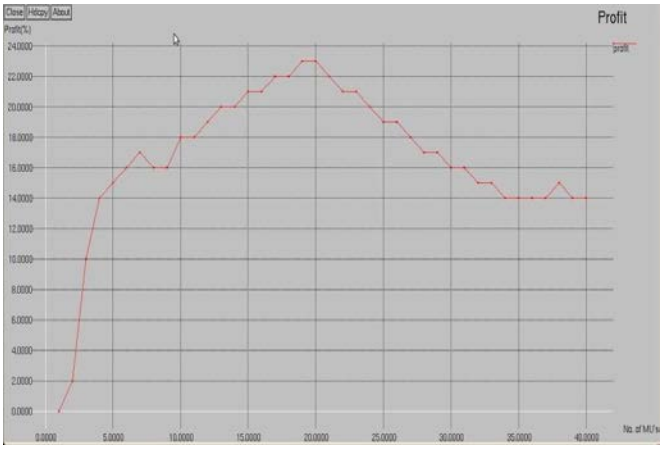

Fig. 7 Profit vs Number of mobile user

As shown in the figure 7 it shows the overall profit of the system. The graph shows the overall profit of the system if the number of the mobile nodes increases the profit will decreases as shown in the figure 7.

VI. CONCLUSION

We presented the Technique called lateration technique by implementing this technique to the OFDM base station the bandwidth can be powerfully obtained. The requirement of the corresponding requested mobile nodes the bandwidth can be allocated and the overall profit of the system can increased. Hence the entire bandwidth allocation can be done by the OFDM base station and its results to the deployment of Multiple input Multiple output (MIMO) is not expensive.

VII. FUTURE SCOPES

In the MIMO technology due to the nodes colliding frequency the delay tolerance, flow rate will affect the system performance. By implementing the maximum-minimum algorithm to the OFDM base station the collision will be eliminated and the maximum throughput can be achieved.

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