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High Throughput Bit Allocation in Uplink Multicarrier OFDM Systems

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ABSTRACT

In the modern technology wireless communication plays a vital role in our day to day life. It has wide range of applications such as cell phones, security systems, and televisions remote control, Wi-Fi, Wireless Power Transfer, Mobile Satellite Communication and Wireless Sensor Networks. For a cellular system where mobile terminals transmit in the uplink to the base station (BS) using multicarrier orthogonal frequency division multiplexing (MC-OFDM), proposed system consider multicell processing among BSs. Received signals are quantized per-subcarrier basis and then forwarded to the serving BS. With the aim of maximizing the network throughput, it has the following aspects

a. Design an efficient composite signal representation.
b. To nominate the percentage of share by a loop statement of the attainable throughput in the existence of total noise, constant rapacious algorithm for the backhaul percentage share is produced.

Where at each iteration, the signal is selected and it is exchanged as the one that provides the maximum network throughput increase per backhaul bit .In order to determine how many quantization bits are used, and to reduce scheduling complexity for each received signal ,proposed system consider a static bit allocation with fixed number of bits. This work concentrates on bit allocation problems in multi carrier OFDM systems with multicellular processing involving the latest transmission and channel modeling schemes. In particular, the target is to develop high throughput transmission strategies from the system level point of view to reduce the complexity while maintaining the quality of service.

KEYWORDS: *Resource allocation and interference management; MIMO systems; 3.5G and 4G technologies; broadband mobile communication systems; cellular technology.*

I.INTRODUCTION

1.1 INTRODUCTION TO BIT ALLOCATION IN OFDM SYSTEM WITH MULTICELL PROCESSING

Behind the major force driving from systems of cellular is weighted by the information share in between uplink and downlink, in account of providing applications newly to the user always. To this end, a significant contribution is given by multiple antennas, which bring both diversity and multiplexing gain, resulting into a multiple input multiple output (MIMO) system. Since the uplink is highly influence by inter-cell interference (ICI) of mobile terminals (MTs) in neighbouring cells, combining signals received by many base stations (BSs) before detection is a good strategy to increase the uplink data rate without the need of increasing the number of BS antennas. This cooperation among BSs, which goes under the name of multicell processing (MCP) or coordinated multipoint (CoMP), implements a distributed (network) MIMO system. CoMP brings new challenges to the cellular architecture. The need of suitable communication infrastructure based BSs, a was searched in the backhaul currently carrying data signals between the radio network controller (RNC) and the BSs.

As BS-RNC communications are early made in the soft handoff of MTs, they become much more order in CoMP, up to the point that modern backhaul infrastructure may constitute a bottleneck. So the backhaul scheduling and the representation of signals redesigned over the backhaul must be in proper method. In the signal diagram, energy have been generally pointed on squeezing manner exploiting the correlation among signals received at the various BSs. Tested measurements are applied in to proper frequency domain compression techniques for orthogonal frequency division multiplexing (OFDM) systems. During the allotment turn, a solution numbers were devised, including transmitting MTs selection, reworking of transmission percentage, and allocation of BSs co-operating. Based on the transmitting MTs selection, trade-off proposes between the wireless connection share and the backhaul activity, while more recently, in power and active subcarriers of MTs are optimized to maximize the system throughput. Concerning the adaptation of the MT transmission rates, many information-theoretic works have analysed the performance of CoMP with a constrained backhaul. In the project recall in particular initial works, characterizing achievable rate regions, while more recently, the impact of imperfect channel estimation has been considered in. Since the complexity of selecting cooperating BSs grows exponentially with the number of MTs and BSs, efficient techniques have been considered, including genetic algorithms, use of sphere decoder, dynamic greedy algorithms, also in conjunction with the use of hybrid repeat request (HARQ).We focus here on the issue of cooperating BS selection, given that a set of MTs has been scheduled for transmission.

At first, start observing that most of existing approaches have been developed for flat fading channels, or for sets of parallel flat fading channels, i.e., OFDM transmissions. However, 3GPP long term evolution (LTE) standard provides the use of single carrier frequency division multiple access (SC-FDMA). With this transmission format, a single carrier signal is allocated to a number of subcarriers in the frequency domain by means of discrete Fourier transform (DFT). A simple linear equalization is performed at the receiver, still in the frequency domain, while detection and decoding occur in the time domain. As continuous equalization is substandard to non-continuous receivers then produce a poor outcome than OFDM.

1.2 OFDM SYSTEM

The information given at input are in sequence are modulated baseband, making using of modulation in digital system. Various modulation schemes could be employed such as BPSK, QPSK (also with their differential form) and QAM with several different signal constellations. There are also forms of OFDM where a distinct modulation on each sub channel is performed (e.g. transmitting more bits using an adequate modulation method on the carriers that are more confident, like in ADSL systems). Also, data can be encoded in frame (the baseband signal modulation is performed on the serial data, that is inside of what we name a DFT frame), or inter frame (the modulation is performed on each parallel sub stream, that is on the symbols belonging to adjacent DFT frames). The data symbols are parallelized in N different sub streams. Each sub stream will modulate a separate carrier through the IFFT modulation block, which is in fact the key element of an OFDM scheme, as

A cyclic prefix is inserted in order to eliminate the inter-symbol and inter-block interference (IBI). This cyclic prefix of length L is a circular extension of the IFFT- modulated symbol, obtained by copying the last L samples of the symbol in front of it. The back- serial converted information, producing an OFDM pattern make high-frequency carrier are modulated before it gets pass along the channel. The radio channel is generally referred as a linear time-variant system. In the section of receiver, the operations are inversely made where the information are inversed to the baseband and removed cyclic prefix. The coherent FFT demodulator will ideally retrieve the exact form of transmitted symbols. The serial converted data and the scheme of demodulation are made use to calculate the system design.

1.3MIMO

MIMO technology has attracted attention in wireless communications. MIMO systems have various advantages over SISO systems:

1. Significant increases in data transmission without additional bandwidth or transmit power. It achieves this by higher spiritual capability and link reliability or diversity (reduced fading).

2. No need to alter the common air interface while upgrading.

3. With numerous techniques of coding, fade duration and depth are minimized.

These properties make MIMO a hot research area in the field of communication. As MIMO‟s diversity are against well of multipath, it can be ever developed more by mixing it with some major techniques: Wavelet Packet based Multi Carrier Modulation (WPMCM) and Orthogonal Frequency Division Multiplexing (OFDM). OFDM and WPMCM in mobile communications are countered by Inter-symbol interference (ISI).

The rest of the project report is organized as follows. In chapter 2 the proposed system and in Chapter 3 describes the result and discussion.

2. PROPOSED SYSTEM

2.1 INTRODUCTION

Multi-Carrier Orthogonal Frequency Division Multiplexing (MC-OFDM) is an efficient technique for achieving high uplink capacity in high-speed communication systems.

2.2 BLOCK DIAGRAM

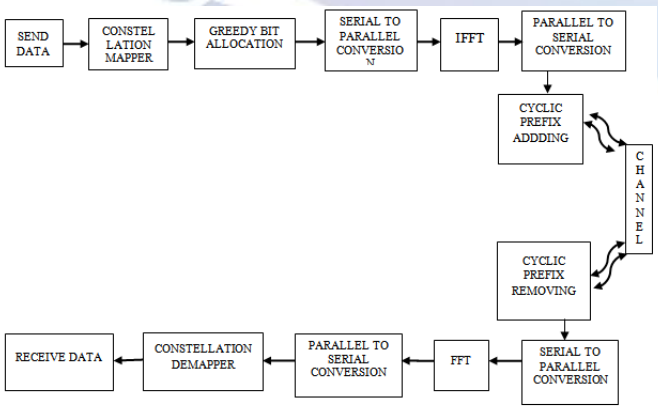


Fig 2.1 Block Diagram of OFDM

2.3 MODULES

1. OFDM Transmitter
2. Channel
3. OFDM Receiver
4. Bit allocation algorithm

2.3.1 OFDM TRANSMITTER

OFDM transmitter we give input data for transmitting purpose. The input data is fed as input to the Constellation mapper. The Constellation mapper consists of a QAM modulator. It maps the incoming bits onto separate sub-carriers. IFFT - The IFFT converts frequency domain constraints to time domain. The time domain values are transmitted as OFDM signals through the transmitter. Cyclic prefix is basically a fractional portion of an OFDM symbol that is placed at the beginning of the symbol. It completely removes inter-symbol interference that can occur due to Multipath. Finally the data transmitting to channel.

2.3.2 CHANNEL

OFDM performs in an Additive White Gaussian Noise (AWGN) channel. In this channel only one path between the transmitter and the receiver exists and only a constant attenuation and noise is considered. Additive white Gaussian noise (AWGN) is a basic noise model used in Information theory to mimic the effect of many random processes that occur in nature. AWGN Channel adds White Gaussian noise to the signal when it is passed through the channel. In white Gaussian noise, at any set of times the values are distributed similarly and independent of statistical over other. AWGN channel is not associated with either fading or any other system parameters. That is the noise are added normal to the modulated signal of OFDM while it is passing along the channel.

2.3.3 OFDM RECEIVER

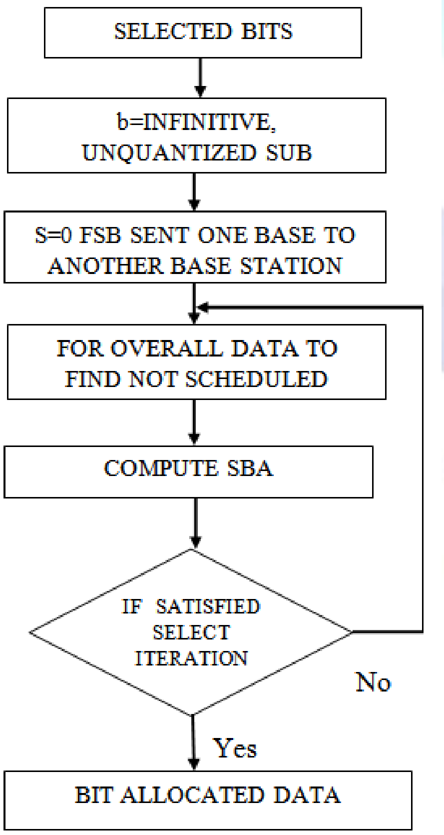
The OFDM receiving unit receives its input directly from the transmitter whenever its output is available. The cyclic prefix was added at the transmitting end in order to avoid inter-symbol interference, therefore during reception it must be eliminated for any further processing of the received signal. In the receiver section, this is the main module. OFDM signals are received from the channel signal and are fed to the FFT, which converts them back to frequency domain. The output data is fed as input to the Constellation demapper. The

Constellation demapper consists of a QAM demodulator. It maps the incoming separate sub-carriers onto bits. Finally get the output data.

2.3.4 BIT ALLOCATION ALGORITHM

The scheduler complexity is a problem of OFDM transmission. It reduces the throughput of the model. To maximizing the network throughput we use the Greedy bit allocation algorithm. In each iteration, the algorithm schedules one more bit. Initially iteration equal zero quantized subcarrier signals get on its wireless channel. Iteration greater than zero corresponding to the subcarrier signals belonging to bits , Base station transmitter sent to base station Receiver. From overall data scheduled data for apply greedy algorithm. In Static Bit Allocation (SBA), we assume that each subcarrier signal is quantized with a fixed number of bits. This process repeatedly occur till satisfy iteration. Finally out bits are efficiently allocated to subcarrier transmission. These processes increase the throughput.

2.3.4.1 FLOW DIAGRAM FOR BIT ALLOCATION ALGORITHM



Condition for not scheduled bits

$Tt = \{(s, i, j) \in S \times J \times J: [bt-1]\ n, i, j = 0, n \in Ns\}$ (2.0)

Tt-tuple,s-available FSB,i,j-base stations.

Condition for bit allocation

$\sum b_n(j)' \leq b^{(BH)}, j \in J.\ n \in N$ (2.1)

$b^{(BH)}$ - max number of bits that can be sent from BS to other.

2.4 IFFT AND FFT

The ingredient of an OFDM is the inverse FFT placed in transmitter and FFT placed at receiver. The operations achieved linear aliging between N-complex information design and N- complex OFDM design, concluded in robustness a opposes multipath fading channel. The reason is to transform the high data rate stream into N low data rate streams, each experiencing a flat fading during the transmission. Suppose the data set to be transmitted is X (1), X (2), ..., X (N) where N is the total number of sub-carriers. The discontinuous-space signal representation next to IFFT is:

$$x(n) = \frac{1}{\sqrt{N}} \sum_{k=0}^{N-1} X(k).e^{j2\pi k \frac{n}{N}}, \qquad n = 0..N-1$$ (2.2)

At side of receiver, the recovered information by FFT performing on the signal received

$$Y(k) = \frac{1}{\sqrt{N}} \sum_{n=0}^{N-1} x(n).e^{-j2\pi k \frac{n}{N}}, \qquad k = 0..N-1$$ (2.3)

2.5 CYCLIC PREFIX

The cyclic prefix is addition to an OFDM design in order to encounter the multipath effect. Inter Symbol Interference(ISI) is banned among neighbour OFDM design by entering a guard period in which the multipath elements of the expected signal are provided to crash out, after which the another OFDM design is get transmitted. A meaningful technique is needed to improve the complication of the receiver is to allow a guard design while the guard period is present. Importantly, guard design is selected to be a prepaid extension at every block. The sense for the design to convert the convolution of the linear signal and path in the configuration of circular convolution and here by affect the FFT of the circular convolution of signal and path to simple product of their FFT' respectively.

According to the technical work, the guard gap should be higher than the delay of the channel spread. Thus the normalised length of the prefix cyclic depends on the ratio of the delay of the channel spread to the duration of the OFDM symbol.

Cyclic prefix is a compelling article of OFDM to act the multipath path. Inter symbol interference (ISI) and inter channel interference (ICI) are avoided by introducing a guard interval at the front, which, specifically, is chosen to be a replica of the back of OFDM time domain waveform.

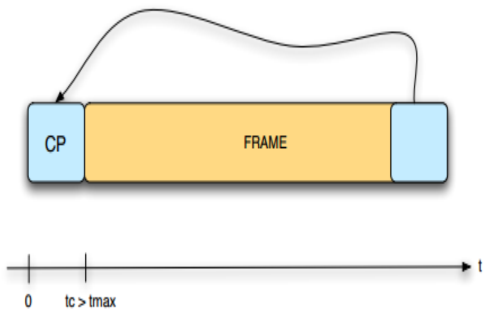


Fig 2.2: Adding a cyclic prefix to a frame

2.6 MODULATION AND DEMODULATION

Quadrature amplitude modulations (QAM) are based on an analog and a digital scheme of modulation. It transmit two digital signal message, or two analog streams of bit, by altering (modulating) the amplitudes of carrier in form of two waves , using the amplitude-shift keying (ASK) analog modulation scheme or amplitude modulation (AM) digital modulation scheme. Dual carrier waves, usually to the form of sinusoidal waveform, 90° waveforms are out of phase are represented as quadrature carrier and quadrature elements since the title of the systems. The added waves of modulation, and the resulted waveform are get together with both phase-shift keying (PSK) and amplitude-shift keying (ASK), or (in the analog case) of phase modulation (PM) and amplitude modulation. In the digital QAM case, a finite number of at least two phases and at least two amplitudes are used. PSK modulators are frequently made using the QAM rule, but are not assumed as QAM since the modulated carrier signal amplitude is constant. QAM is used extensively as a modulation scheme for digital telecommunication systems. Irrationally spectral efficiencies are highly can be achieved by QAM by making a correct constellation size, limited only with level of noise and continuous communications channel.

A modulator is get transformed a set of bits to a complicated number related to components of a constellation signal. In this paper, in the bit allocation algorithm modulator has the input a set of bit and value of energy. So, the modulator output has a constellation symbol related to the count of bits in the input parts in a appropriate manner and also scaled to get a expected energy. The modulator has taken only in a finite number of rates (U). In modulation, finite number of constellations specifically, these constellation are mapped from the set of constellations having total number of symbols equal to power 2. Further, in addition to provide robustness among bit error. Gray code constellations are implemented at each modulation. This gray scale denotes, that if symbol error occurs, the adjacent symbols is get selected in decoder to which transmitter are tends to be decoded. To increase the robustness at the receiver during demodulation in order to reduce the bit errors, Gray coded bit assignment constellation is also implemented. Gray coding make sure that an adjacent symbol can be selected even if a particular symbol contains error or corrupted at the decoder, this resulting only a single bit error instead of treating the whole symbol as an error where retransmission is required.

2.7 SINGULAR VALUE DECOMPOSITION

In linear algebra, the is a factorization of a real or imaginary matrix is singular value decomposition. It has many useful applications in signal processing and statistics.

First, the $m \times n$ real or complex matrix M of singular value decomposition is a factorization is $M = U\Sigma V^*$ form, where U is an $m \times m$ real or imaginary unitary matrix, Σ is an $m \times n$ rectangular diagonal matrix with zero or positive real values on the main diagonal, and V^* (inverse of V, if V is real) is an $n \times n$ real or imaginary unitary matrix. The entries in diagonal $\Sigma_{i,i}$ of Σ are called as the singular values of M. The columns of V are the left singular matrix vector and M is right singular matrix

The singular value decomposition and the Eigen decomposition are closely related. Namely:

- The M-left singular vector are MM* Eigen vectors
- The M right-singular vectors are M*M eigenvectors.
- The non-zero singular values of M (found on the diagonal entries of Σ) are the square roots of the non zero Eigen values of both M*M and MM*.

The employed applications with the SVD include calculating the false transpose, squares with least fixing of information, multi-variable control, approximate matrix, and determining the range, rank and zero space level of a matrix.

Suppose **M** is an $m \times n$ matrix whose entries come from the field *K*, which is either the field of real numbers or the field of complex numbers. Then there exists a factorization of the form

$$\mathbf{M} = \mathbf{U}\boldsymbol{\Sigma}\mathbf{V}^* \quad (2.4)$$

where **U** is an $m \times m$ unitary matrix over *K* (orthogonal matrix if $K = \mathbf{R}$), **Σ** is a $m \times n$ diagonal matrix with non-negative real numbers on the diagonal, and the $n \times n$ unitary matrix $\mathbf{V}^*$ denotes the conjugate transpose of the $n \times n$ unitary matrix **V**. Such a factorization is called a singular value decomposition of **M**. The diagonal entries σ_i of Σ is known as the **singular values** of **M**. A normal convention are arrange in descending order of singular value decomposition. In this case, the diagonal matrix **Σ** is uniquely determined by **M** (though the matrices **U** and **V** are not).

Assume MIMO scheme providing transmit antennas and receive antennas. Every tone, the response of the MIMO channel showing by a size m x n matrix where the element $h_{j,k}$ matrix shows the gain of channel from transmitter k to receiver j. Consider the case of correct channel state data at the transmitter and receiver, so it can decay the channel of the MIMO based on every tone to corresponding non-crossing channels make use of the singular value decomposition (SVD).

Singular value decomposition (SVD) has the instantaneous channel matrix on the i th tone

$$\boldsymbol{H}_i = \boldsymbol{U}_i \boldsymbol{S}_i \boldsymbol{V}_i^* \quad (2.5)$$

The unitary matrices are U_i and V_i and diagonal matrix of singular values of H_i is S_i. Pointing that the operator (.) is the inverse operator for transpose. Now, use V_i a transmit precoding iteration and U_i a receiver shaping i iteration, the equal MIMO channel between the FFT and IFFT decays into equal level of channel division. Pointing the sub channels numbers exactly equal to the nonzero singular values of H_i numbers. Note the value by c (i).

This is followed to every OFDM channel division system. Normally every precoder and structure of matrix will be vary for various channel division.

2.8 PRECODING

Precoding is a principle of beam making to stoning different stream in multi-layer transmission in multiple antennas in wifi. In traditional one-stream beam forming, the same emitted signal in every antenna transmits with revalent sway (gain and phase) such that the signal strength was expanded in output. When the receiver has many antennas, stream of single beam making was not maximize the signal strength at various antennas in receiver. In form of expanding the signal in many antenna receiver systems, different stream transmission is normally prescribed.

In end to end systems, precoding is a many information streams are out performed from antennas in transmitter side are flow freely and relevant way so the throughput is expanded at the receiver level. In multiple user MIMO, the information streams are calculated for different users OFDMA and some level of sum of throughput are extended. In end-to-end scheme, less number of the prosperity of preceding can be accepted under no requirement of state of channel data from the emitter, although data's are needed for maintain the Inter User Interference (IUI) at multiple user scheme. Precoding in the downlink of mobile networks, MIMO or coordinated multipoint (CoMP), is a normalised form of multiple user MIMO are supervised under equal mathematical ideas.

In end-to-end multi-input, multi-output (MIMO) schemes, a transmitter componented with many antennas broadcast by receiver with many antennas. Maximum typical precoding outcomes considered to be narrowband path, slow channel fading, define the channel for some interval of space are mentioned by a channel in single matrix that cannot shift rapid. Though, such achieved channel, in case of OFDM. The precoding planning which enlarge the throughput is dense of channel that depends on the channel date eligible in the scheme.

As the matrix of channel is fully given, singular value decomposition precoding is calculated to get the capacity of channel matrix. In this access, the matrix is gradient by getting singular- value decomposition and erases the matrices of two unitary by front and back multiplication at the input and output respectively. Next single information flow for each singular value can be emitted by not producing any crossing level.

2.9 CHANNEL MODEL

In this full scheme of system, the channel are simulated to be channel fading, paralleling to a high emitting surrounding with the space allocation are describe by the fade space. In case of MIMO the channel matrix with formula

$$y_n = \sum_{l=0}^{L-1} H_l x_{n-l} + n_n \tag{2.6}$$

Where, the integrity y_k, x_k, n_k be vectors, and H_k are to be matrix. Though, the lag scatter is L design time. An aggressive-decomposing portrait taps of channel is designed by mending the powers of all the components in every irregular matrix H_k to a fixed E_i. Those values E_i produce a decomposition of shape variable progression i. While a continuity space gap, every matrix H_k are fixed and when decorrelated channel is arrived, they are taken into new. Then for ordinary it was guessed that the decorrelated channel at last of design ejected OFDM.

Estimated channel alters the reaction of non-selective fading on every carrier division. Mostly OFDM scheme are with pilot signals for estimation of channel. In the account of space-changing channels, the pilot signal should be given again frequently. The gap between pilot signals in frequency and time are based on continuity of time and transmission capacity.

As far as, the estimated channel are guessed to be best, and given to both the input and output components. By knowing the details of the channel, the input and output components can be calculate the channel's frequency level, and at every tone, the OFDM symbol gains the channel. Those gains can be the algorithm, that adaptive to improve the allocation of bit optimally.

3. RESULT AND DISCUSSION

All over the reflection, the whole scheme is only mentioned to be separate space scheme. Yet, these scheme aspects are similarly quite to consolidate, and not able to start significant observation over those analysis with the separate space scheme.

The following parameters were held constant on the simulation:

Number Of Symbols	64
Guard Interval	16
Tx Antennas	1
Rx Antennas	1
Max Constellation Bit Number	8
Total Bits	64 x 1

Table 3.1 Parameters held on simulation

In a model have to create a channel. In the simulation, the MIMO channel is model based on the equation below,

$$y_n = \sum_{l=0}^{L-1} H_l x_{n-1} + n_n \tag{3.1}$$

To find channel gain H_l add with AWGN noise. In each channel could be transformed into a circular convolution from their linear convolution of the signal, this operation could be done by using FFT function in MATLAB and find the channel impulse response and channel gain.

This AWGN random number can be easily generated independently for both the real and complex component with the randsrc in-build function of MATLAB.

Each of the tone of MIMO channel can be decomposed into non-interfering parallel channels using SVD decomposition. The random data bits are generated with the randsrc function, and then normalising it to contains only binary digits 1 and 0 as shown in fig 3.1.

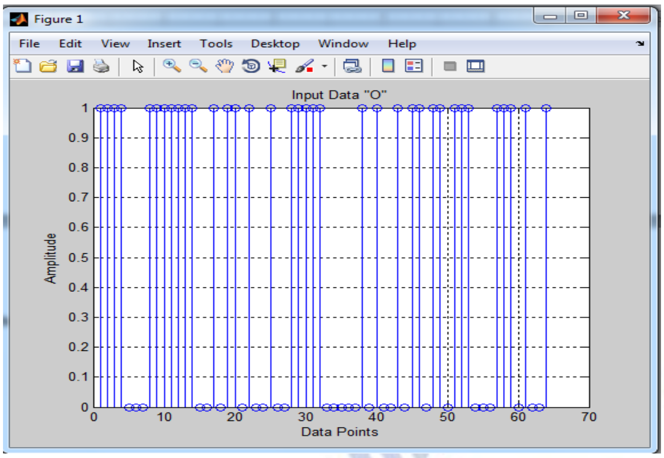


Figure.3.1 Input binary data generation

At the initial state of the simulation, all these MQAM data will be loaded for the use later in the process of modulation and demodulation. For QAM modulation load the data MAT file of each constellation into the MATLAB workspace.

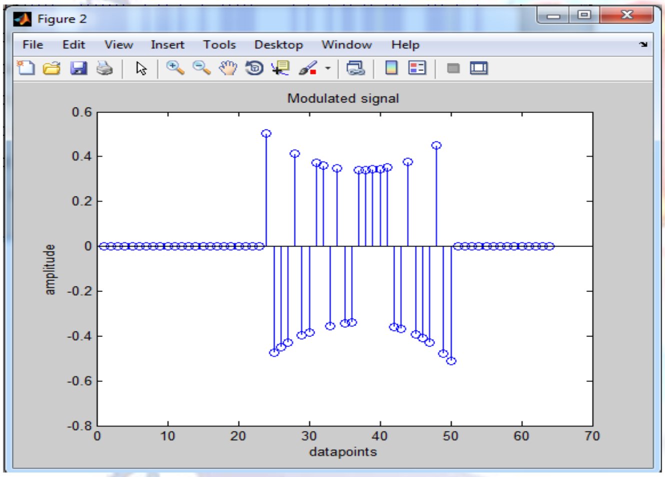


Figure.3.2 QAM modulation with allocated signal

Six level of MQAM signal constellation will be considered, or more specifically they are 0, 2, 4, 16, 64, 256 QAMs. In a modulation of input data allocated to each subcarrier will be multiplied together with the complex constellation during the modulation as determined before by the greedy bit allocation algorithm. In a modulation signal send with energy. The modulated output shown on Fig 3.2.

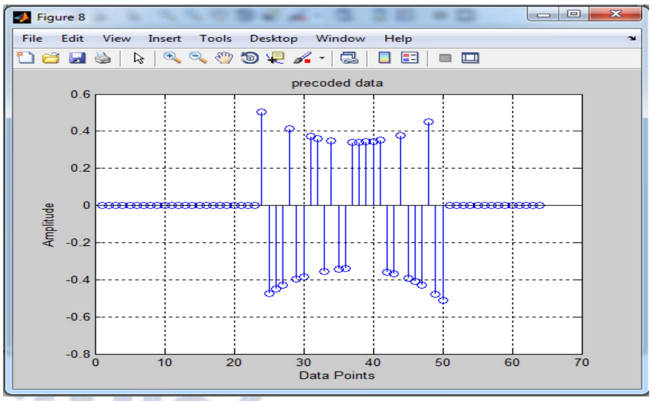


Figure.3.3Precoded data signal

After applying precoding for align modulated signal along with channel mode. Precoded output shown on fig 3.3

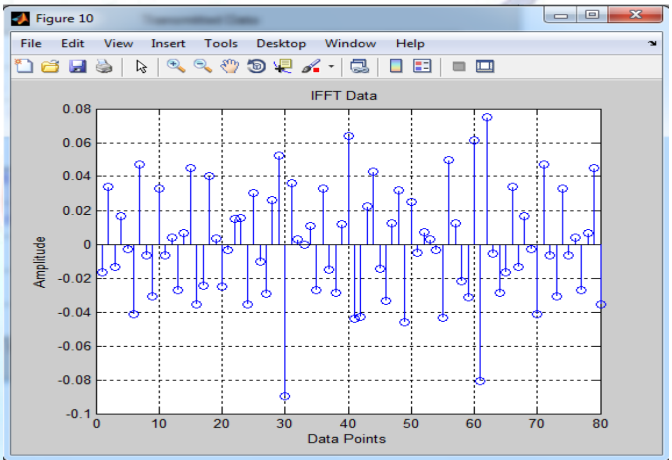


Figure.3.4 IFFT transformed output signal

Applying IFFT process change time domain to frequency domain and add with cyclic prefix code for reduce inter symbol interference. IFFT output shown on Figure 3.4

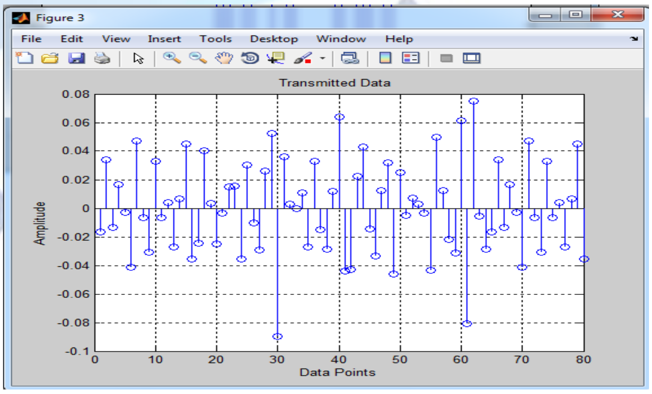


Figure.3.5 Transmitted OFDM signal

After reshaping parallel to serial conversion, OFDM signal transmitted through antenna. Figure 3.5 shows the transmitted OFDM signal.

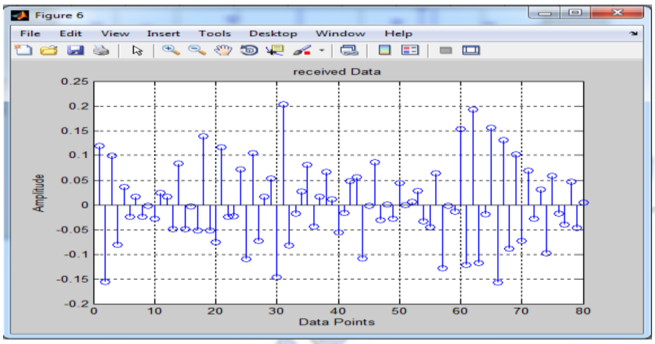


Figure.3.6 Received OFDM signal

The OFDM signal pass through AWGN channel so signal adds with noise. Received signal shown on Figure .3.6

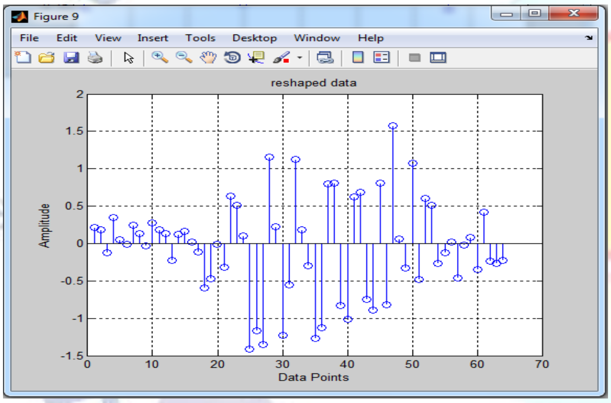


Figure.3.7 FFT transform of Signal

After receiving OFDM signal apply FFT process change to time domain and remove cyclic prefix code. Figure 3.7 shown the FFT transform of received signal.

The demodulation process is also similar as the modulation process but it is done in a 'reverse' manner. The receivers also have the information for the bits allocation, which will then ease our demodulation process.

After recovering the constellation index by finding the nearest distance between each estimated symbol, their corresponding binary data bits could also be recovered by comparing to the code word index. Figure 3.8 shows the recovered and demodulation signal

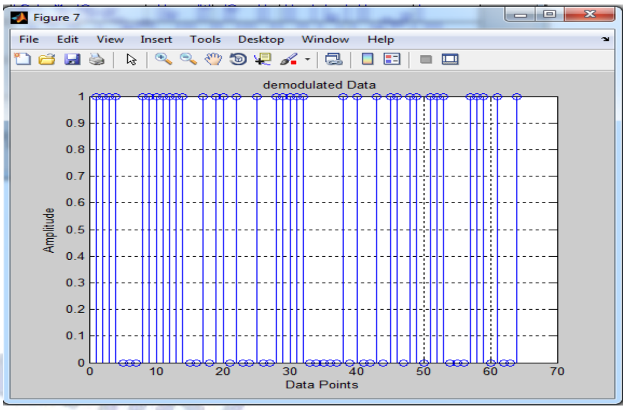


Figure.3.8 Demodulated of signal

After the demodulate process block, and since the transmitted data is recovered now, the data can then be sent to the next block for the wireless transmission performance calculation.

To analyse the performance of a telecommunication system is by computing the value of Bit Error Rate, or Bit Error Ratio (BER). BER evaluate the system performance by calculating the total number of error bits received during a transmission and comparing it to the total number of original transmitted data bits, a simple mathematics representation is shown below:

$$BER = \frac{\text{TOTAL NO OF ERROR RECEIVED}}{\text{TOTAL NO OF DATA TRANSMITTED}}$$

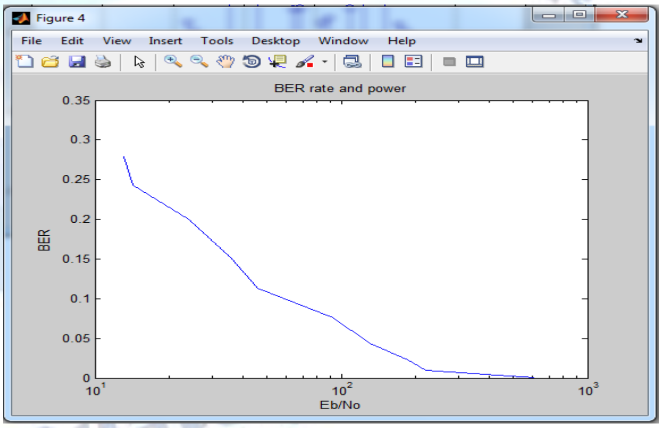


Figure.3.9 Performance on BER

BER is an ideal solution to be used for determining and analysing the performance of the wireless transmission and will be implemented here. The smaller the BER, the better the performance, and since BER is evaluated as a ratio, so a value of BER = 1 is therefore the worst condition where all the transmitted data appears to be an error at the receiver. To know performance plot the

BER rate shows low bit error rate and high performance. It shown on fig.3.9

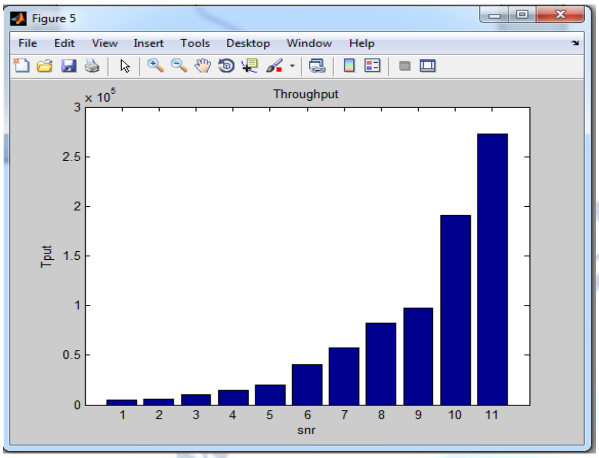


Figure.3.10 Throughput of OFDM

To Calculate the Throughput and plot the SNR with Throughput. If SNR ratio increases the throughput also increases linearly. Finally we increase the throughput via greedy bit allocation algorithm. Fig 3.10 shows the Throughput of OFDM system.

4. CONCLUSION AND FUTURE ENHANCEMENT

In this project proposed an optimal solution for the bit allocation problem with proportional rate constraints for MC-OFDM systems. It benefited from the greedy bit allocation to proportionally allocate the available subcarriers to the users. In this static bit allocation increase the Throughput of uplink multi user OFDM with low complexity. To achieve MIMO/OFDM is a very auspicious machinery, and possible eager bit allocation produce in better to boost the achievement.

ADVANTAGES

- OFDM overcomes effect of ISI occurring mostly in multipath channel environment.
- Frequency selective fading will be able to affect few of the sub channels /subcarriers and not entire band.
- High Quality of service
- Lower complexity
- Efficient algorithm
- High Throughput

APPLICATIONS

- Wi-MAX
- LTE (Long Term Evolution)
- 3GPP cellular communication
- 4G mobile communication

Our future work will be a new optimal power direct allocation algorithm. According to our bit allocation results, to improve power allocation algorithm aiming to allocate the total power at a time to all sub channels in OFDM.

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