Abstract - Here we propose an Antenna selection schemes using MIMO-OFDM wireless systems. In the MIMO OFDM systems, the expressions are evolved for both the energy efficiency and the energy efficiency- spectral efficiency (EE-SE) trade-off. The attained result from these systems tells that the system has significant loss in the energy efficiency. Here a method is proposed for better performance of energy-efficiency that is adaptive selection method. The proposed system mainly depends up on the condition of channel when we chose the number of active RF (radio frequency) chains and the antenna indices. This scheme is improved by using the small number of antennas from extensive search technique. Further, we impose an algorithm for acquire a near-optimal performance with lower complexity compared with (optimal) exhaustive search method. In this paper we describe about the adaptive modulated multi-input multi-output orthogonal frequency division multiplexing which enables the effective communications in Ultra Wide Band (UWB) systems with low signal-to-noise ratio. An adaptive resource allocation algorithm based on sequential allocation is proposed from the adaptive power research and bits allocation scheme in modulated MIMO-OFDM for UWB communication system. The simulation results suggest that the scheme is much simpler and more practical than the optimal allocation scheme at the small expense of performance.

Keywords - Antenna Selection, Energy Efficiency, MIMO, OFDM Systems.

I. INTRODUCTION

In recent years, there is increasing in demands for highspeed wireless communications. Basically, reducing the energy consumption in wireless networks is of significant interest among academic and industrial researchers. Because of costs and operating wireless networks the number of customers will be increased [1]. Therefore, the information bits that is transmitted per unit energy (bits/Joule), is called as energy efficiency. The energy efficiency is considered as the key design metrics for the future networks [2], [3]. So, the development of energy efficiency in wireless systems is managed at the component level (e.g., improve power amplifier efficiency), link level (e.g., discontinuous transmission and sleep modes), or network level (e.g., the layout of networks and their management) [3], [4].

Couple of input multiple output orthogonal frequency division multiplexing (MIMO-OFDM) methods furnish high spectral affectivity for wireless communication system. However, they have an essential problem of high peak to average power ratio (PAPR) which outcome in inefficient use of energy amplifier. Therefore, many experiences have sought to develop PAPR [5] discount methods. For single-input single-output (SISO) OFDM[6], iterative clipping and filtering (ICF) process are provided, and an optimized ICF system is used with no trouble lowered PAPR[7]. Here the both schemes exhibit the efficiency in SISO-OFDM.

UWB (Ultra-wideband) technology has been proposed as an alternative air interface for Wireless Local Area Networks (WLAN) and Personal Area Networks (PAN) because of its slow power spectral density and high data rate. It has the advantage such as insensitivity to path loss, concealment, robustness to multipath fading and narrowband disturbance, big capacity and low complexity of the system. MIMO (Multiple Input Multiple Output) technology synthetically utilizes of multifarious diversity, which use multi-transmitting multi-receiving antennas and digital signal processing technology to realize high-speed, bandwidth, reliable communications in wireless environments. Combination of space-time multiplexing and OFDM technology can achieve every high spectrum efficiency in high-speed broadband wireless communication.

For MIMO-OFDM [8] programs, even though a convex optimization headquartered traditional method can be effortlessly multiplied to a MIMO precoding system, the peak to average power ratio (PAPR) efficiency is degraded when the number of transmission antennas[9] raises beneath the fixed number of knowledge streams. Therefore, the main intent is to use redundant spatial resources to decrease PAPR. With an identical idea, the authors of elevated PAPR efficiency by using null spaces of MIMO channels founded on a convex optimization.

Additionally, they showed a theoretical sure of the PAPR efficiency such that a close unity PAPR (PAPR ≈ 1) can be accomplished when the number of transmission antennas is infinite. Although the presented scheme has comfortably improved PAPR efficiency for massive-scale MIMO programs [10], it suggests the confined efficiency enhancement below
the current realistic MIMO configurations similar to 4 × 2 or 8 × 2 MIMO, which motivates us to rethink and suggest a novel precoding system for further improvement of PAPR performance.

In this paper, the main advantage of a generalized inverse of the correct singular matrix of the MIMO channel is to make use of redundant spatial dimensions at the transmitter. Basically, the generalized inverse matrix inherently involves uncontrollable matrix consists of key design parameter to lower PAPR. Mainly, it has a constant phase that we use for acquiring the spatial multiplexing attain. We introduce a constant parameter $\alpha$ that quantifies the received signal-to-noise power ratio (SNR) loss at the cost of PAPR reduction. The constant $\alpha$ also can show the tradeoff between PAPR reduction and the received SNR loss. Even in cases of small SNR loss, the proposed method significantly improves PAPR performance since the maximum amplitude of time-domain signals is minimized while keeping the average transmission power at a certain level. Simulation results show that the proposed method will outperforms the current methods and provides a PAPR close to 1 with small SNR loss in case that the number of transmission antennas is large enough.

I.EXISTED SYSTEM

Multiple-input multiple-output (MIMO) systems enable higher data rate via the spatial multiplexing (i.e., transmitting different data streams with same bandwidth). Orthogonal frequency division multiplexing (OFDM) systems can effectively turn the frequency-selective channel into multiple flat channels at different subcarriers, allowing one-tap channel equalization. As a result, MIMO-OFDM systems have been employed in many modern communication systems, such as long term evolution (LTE) and wireless local area networks (WLAN).

Unfortunately, OFDM systems are sensitive to phasenoises of oscillators. The effect of phase noise on OFDM or MIMO-OFDM system has been extensively studied in the literature. The phase noise can cause a common phase error (CPE), i.e., a phase rotation that is the same for all the subcarriers, and intercarrier interference (ICI), i.e., the subcarrier symbol is contaminated by symbols from other subcarriers. The CPE can be readily corrected by estimating the common phase rotation, whereas the ICI compensation needs more advanced signal processing. Nevertheless, given phase noises, the ICI can be alleviated by employing large subcarrier spacing or low modulation order. Almost all the previous works on phasenoise effects on MIMO-OFDM system assume uncorrelated MIMO channel (without antenna effects) e.g., except for where spatial correlation was considered.

The combination MIMO-OFDM is more advantageous. So, it simplifies the equalization more efficiently in MIMO systems. Multiple-Input Multiple-Output (MIMO) and Orthogonal Frequency-Division Multiplexing (OFDM) technologies will attain the data rates up to several hundreds of Mbits/s. The spectral efficiencies of bits/Hz/s, are conventional for the single-input single-output systems. The data rate and spectral efficiency will attain from the certainty because MIMO and OFDM methods. But it uses parallel transmission technologies in the frequency domains, and space respectively. OFDM signal is transmitted from the number of antennas to achieve the diversity of gain in higher transmission rate. Hence, it is known as MIMOOOFDM. System model of single user MIMO-OFDM system is shown in below fig 1.

FIG 1. SYSTEM MODEL OF SINGLE USER MIMO-OFDM SYSTEM

The MIMO-OFDM system performance is depends on the Fast Fourier Transform (FFT). OFDM has been acquired for various transmission systems. In the OFDM system subgroups of subcarriers are allotted. Each user will get a little percentage of the carriers with thousands of subcarriers. One to many subcarriers are allotted for each user in the 4G LTE cellular system. The subcarrier spacing in LTE is 15 kHz. The total achievable number of subcarriers would be 666. In practice, a smaller number like 512 would be utilized. If each subscriber is considering six subcarriers, we can place 85 users in the band. The number of subcarriers allotted will be based on the user’s bandwidth and speed needs.

III.PROPOSED SYSTEM

In this section we propose a point-to-point MIMO-OFDM system with $K$ subcarriers, $n_t$ transmit antennas, and $n_r$ receive antennas.

The number of equipped transmit RF chains is $n_{RF} = n_t < n_T$. A simplified block diagram of the system is shown in Fig. 2. At the transmitter, the input data stream is mapped onto a unit energy M-QAM (M-ary quadrature amplitude modulation) or M-PSK (M-ary phase shifting keying) constellation. The subcarrier
The received signal at each antenna at the receiver is fed into the FFT block after the GI is removed. The received signal in the frequency domain is relative to the Kth subcarrier. Note that the total transmit power in one OFDM symbol is obtained as $P_T = K P_t$. At receiver antenna, the noise is act as a Gaussian random variable with zero-mean and variance. Assume that the receiver uses an MRC (maximum ratio combining) method for signal detection. In this system, the both instantaneous post-processing SNR and the kth subcarrier is calculated. The selection operation of antennas used in this system to maximize the SNR, maximize the capacity, or minimize bit error rate.

The adaptive modulation transmits the power and signal by adjusting transmission power and signal bit rate. So that the SNR $E_b/N_0$ of the receiving end maintains a constant value. For communication system, it is necessary to allocate power and bits between sub-carrier and sub-channel the make sure the SNR $E_b/N_0$ constant after de-modulation. In MIMO-OFDM for UWB communication system, it comprises a great number of sub-channels to get an adaptive modulation scheme which is more complex compared with a single receiving-transmitting antenna system.

It is known that by using the mutual coupling, it will make the antenna patterns of different antenna elements orthogonal and reduces the antenna correlation when compared to the isolated antenna patterns which are correlated (i.e., open-circuit correlation). On the other hand, it reduces the total embedded antennaeffect (including impedance mismatch). In previous works, the effect of mutual coupling was usually measured using MIMO capacity or diversity gain.

In this paper, we discuss about the antenna mutual coupling effect on MIMO-OFDM systems with phase noises in terms of error rate performance. Using the example of parallel dipole antennas, it can observe that the error rate performance of the MIMO-OFDM system at separation of small antenna (e.g., < 0.3 wavelength) with mutual coupling. This phenomenon can be explained using the multiplexing efficiency. It is also shown that, with sufficient OFDM subcarrier spacing and low modulation order, the CPE correction can effectively compensate the noise effect occurred from phase regardless the mutual coupling or correlation.

III. RESULTS

![FIG. 3. PAPR PERFORMANCE (DB SCALE) OF THE PROPOSED SCHEME, CONVENTIONAL SCHEME AND PMP](image)

![FIG. 4. VSER PERFORMANCE OF THE PROPOSED SCHEME, CONVENTIONAL SCHEME AND PMP. NC = 64, 16-QAM, 4 × 2 MIMO.](image)
Adaptive Antenna Mutual Resource Coupling Effect on MIMO-of DM System

This paper shows about the energy efficiency in MIMO-OFDM systems with different antenna selection approaches. The factors which affect the energy efficiency, including the comparison between the actual transmitted power and the power consumed by the transceiver circuits, types of criteria, the number of antennas, and the spatial correlation among antennas, have been examined. From this it can be observed that the conventional antenna selection methods exhibit a loss of energy efficiency. So to overcome this a method is proposed that is adaptive selection method. This algorithm can achieve near-optimal performance, which is important when the number of antennas is large. In addition, the energy efficiency improvement when performing power loading in antenna selection, the MIMO-OFDM systems has been evaluated. This work can be extended to multiuser MIMO-OFDM systems, and we left this for future investigations.

REFERENCES


CONCLUSION

[11]