ABSTRACT

The world without wires is continuously in demand and it is growing at the tremendous speed because of the most important feature of being highly mobile in nature. Wireless devices such as mobile phones have been achieving more and more attraction mainly because of their mobility. Though initially the early phones were compatible with voice applications only, as an innovation data services in terms of text have been added and the latest task is towards multimedia services such as transfer of videos, pictures, etc. have got highly involved into it. These services are not right now versatile but their utilization and implementation in real life is continuously growing. But the main obstacle that is experienced by the emerging wireless networks such as wireless local area networks is the full fledged developed high speed wire line network. On contrary to this the wireless networks are under great demand because of their mobility but still they are not exactly coping up with the high data rates same to that of wired access technologies such as digital subscriber line. To overcome the limitation, either one has to rely on wired network which is not easy to deploy in remote rural areas because of lack of mobility, or has to develop the wireless network with sufficiently high speed that requires high amount of bandwidth. Mobile broadband wireless access offers an elastic and gainful solution to these problems. In recent years the WiMAX (Worldwide Interoperability for Microwave Access) standard has materialized to harmonies the wide variety of different BWA technologies. The first WiMAX version was based on the IEEE 802.16-2004 standard and presented wireless links to fixed subscribers. The most recent 802.16e standard supports broadband applications to mobile handsets and laptops.

The most important property of wireless communication is to provide the endless continuity with high data rate and less time consumption which has becoming the most needy requirement for the future generation telecommunication systems. But there are two fundamental phenomenon of wireless communication that makes the problem challenging and interesting. First is the phenomenon of fading: the variations in the signal strength, frequency and time delay i.e. phase as well as time-variation of the channel strengths due to the small-scale effect of multi path fading, as well as larger scale effects such as path loss via distance attenuation, shadowing, refraction or reflections by obstacles. Second, unlike in the wired communication in which each transmitter-receiver
pair can often be identified as an isolated point-to-point link, wireless users communicate over the air spectrum and there is significant interference between them. The interference can be between transmitters communicating with single receiver (e.g. uplink of a cellular system), between signals from a single transmitter to multiple receivers (e.g. downlink of a cellular system), or between different transmitter-receiver pairs (e.g. interference between users in different cells).

To fulfill the every aspects of the modern wireless communication systems i.e. higher bit rate, lower bit error rate and greater capacity, the most emerging networking standard WiMAX is the best solution. WiMAX is the most promising wireless networking standard having the unique features of 50 kilometers of coverage range as well as throughput up to 70Mbps to cope up with the current requirement. Along with the higher data rate, the above stated two problems of wireless channel can overcome by means of the implementation of Antenna diversity schemes in the WiMAX system as the WiMAX system is supporting advanced antenna systems.

But in the present scenario, WiMAX system has been practically implemented with traditional single transmitter receiver system. And for the real time data transfer of image and speech signals rather than just data with higher quality and faster data rate, under any kind of environment such as AWGN or Rayleigh or Rician, it is necessary to update the realization of WiMAX system. This is what the requirement of antenna diversity schemes at the transmitter and/or at the receiver side to be implemented in WiMAX system along with the Alamouti coding scheme.

As a whole to provide endless mobility with ultimate capacity and reduced bit error rate, the most promising 4th Generation technique is WiMAX system with the implementation of antenna diversity techniques such as MIMO technique along with the most sophisticated space time coding i.e. Alamouti coding for real time data or image or speech transfer.