Ultra Wideband: The Present & Future

Elias K. Garney, ezg113@psu.edu
http://personal.psu.edu/ezg113

Background and Motivation

Ultra wideband, or UWB, is communication based on the transmission of low energy, very short pulses. Obviously, UWB has an extremely large bandwidth which in turn leads to an extremely fine time resolution[1]. Due to this resolution, UWB has very accurate position which is already in use for GPS and is the future of wireless communications. It is already in use for Bluetooth systems and wireless USB connections[2]. As we have already studied the fading effect, it is remarkable to note that UWB does not really get too much of a fading effect. Due to this low transmission power, usually in microwatts, there is very little interference due to UWB propagation[1]. UWB already has applications today, and the future of UWB communications is extremely bright.

Approach and Plan

With the project, I will be researching to thoroughly grasp all UWB concepts found in wireless technology of today. UWB is already found in many new radar systems as well as global positioning systems (GPS). UWB can also be found in medical equipment and radar in the military. When used in GPS, UWB has a theoretical limit of range from the receiver[4]. These algorithms which are used for determining the range will be thoroughly analyzed and its functionality will be observed. Also, there are many other characteristics of UWB transmission that I will be investigating; some of which are the transmission channels, receiver and transmitter guidelines, the spectral characteristics of UWB signals, and FCC rules and restrictions regarding the transmission of UWB signals.

UWB communications are the future of the wireless world. Also with this project, I want to delve into what the future may hold for UWB wireless communications. Between wireless personal area networks(WPANs) and cellular devices, UWB use will be rapidly growing. MB-OFDM, or Multi-band Orthogonal Frequency Division Multiplexing, is a UWB technology that is proposed to be the future standard for high-speed WPANs at the physical layer[1]. I will thoroughly present the pros and cons of this technology, as well as its technical details. Another UWB technology that is cutting edge is the IR, or impulse radio. With no carrier, this cuts down on the complexity of this technique greatly[1]. I will analyze all aspects of the IR technique, as well as its possible applications in the future.

References
