CHAPTER: 19

ADVANTAGES DISADVANTAGES OF UWB ANTENNA

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ADVANTAGES AND DISADVANTAGES OF UWB

Advantages

An UWB communication system has a number of advantages over conventional communication systems including:

- UWB system can achieve high data rate due to its large available bandwidth even for small signal to noise ratio in noisy environments.
- Simpler architecture of UWB devices increased the battery life because very low power consumption.
- Due to very small value of Effective Isotropic Radiated Power (EIRP) by FCC UWB devices could coexist with other electronic users working within the same frequency region thus avoids expensive licensing fees. The low emission and impulsive nature of UWB radio leads to enhanced security in communications.
- This is very suitable for high security application such as military communication. As UWB system uses very low energy per frequency band and precisely time pattern, the probability of detection and jamming is very low.
- UWB transmit short impulses instead of transmitting modulated signal continuously and transmitter power requirements are low, as UWB systems do not require radio frequency (RF) to intermediate frequency (IF) conversion and other intermediate circuitry such as local oscillators, mixers, and other filters.
- Due to huge bandwidth of UWB system, it is possible to accommodate multiple user in UWB based radio multiple access communication system. The two most commonly used multiple access techniques for impulse radio UWB systems are time hopping and Direct sequence (DS) multiple access technique.
- CDMA is a widely accepted multiple access technique, the performance of UWB system is comparable and implementation of UWB system is cheaper than the two most popular CDMA techniques, direct sequence spread spectrum (DSSS) and frequency hopping spread spectrum (FHSS).
- As UWB pulses are very short, the original pulse is not overlapped to the most of signal reflections, thus multipath fading of narrowband signals does not exist.

Disadvantages

Due to large spectrum bandwidth allotted and regulatory issues by UWB technology and other existing radio system should not interfere, the major drawbacks

- The challenging task in the design of UWB system is the interference with other coexisting users.
- UWB technology requires relatively complex and sophisticated signal processing techniques to recover data in noisy environment as, for transmission and reception of carrier free system, every narrowband signal and every other carrier less systems in the vicinity are the potential interferers.
- UWB system uses pulses with picoseconds precision, so the time to achieve bit synchronization between transmitter and receiver can be as high as a few milliseconds. Therefore, the performance is significantly affected as the channel acquisition time is very high.

Applications of UWB system

Some of the applications of UWB over conventional antennas:

- Transferring large amounts of data in short range for home or office networking.
- Short range voice, data, and video applications.
- Military communications (on board helicopters and aircrafts that would otherwise have too many interfering multipath components).
- Anti-collision vehicular radars (through wall imaging used for rescue, security, and medical applications).
- Reducing inventory time and increasing efficiency in several ways (attaching UWB RFID tags to each item inside a box or crate, a scan could count and identify items in the box without it being opened).
- Accurately locating a person or object within one inch of its location through any structure. Global positioning system (GPS) technology is only accurate up to 1.0 m and does not work inside buildings. Also, GPS is expensive compared to UWB.
- Localization in search and rescue efforts, tracking of livestock and pets.
- Detecting land mines.
- Assessing enemy locations and tracking troops.

CONCLUSION

This chapter explains the principle and merit demerit of antenna which can be effectively used along with curve fitting method to design UWB antenna with much accuracy. UWB various technologies and recent researches has been presented in lucid manner to provide an outlook of antenna .It can guide the researcher to avoid interferences and overcome the new challenges.

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