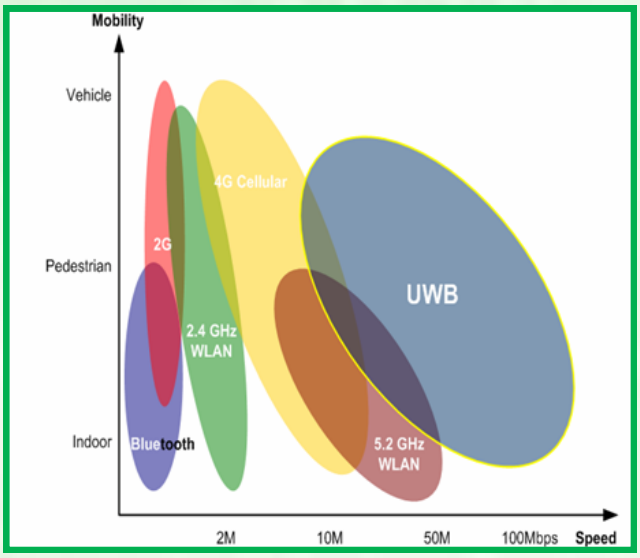
Students Articles

ULTRA-WIDEBAND



ULTRA-WIDEBAND

Ultra-wideband (UWB) technology offers a solution for the bandwidth, cost, power consumption, and physical size requirements of next-generation consumer electronic devices. UWB enables wireless connectivity with consistent high data rates across multiple devices and PCs within the digital home and the office. With the support of industry workgroups, such as the wireless universal serial bus (WUSB) workgroup, and technology leaders, like Intel, UWB technology promises to make it easy to create high-speed WPANs that can connect devices throughout the home.

UWB differs substantially from conventional narowband radio frequency (RF) and spread spectrum technologies (SS), such as Bluetooth Technology and802.11a/g. UWB uses an extremely wideband of RF spectrum to transmit data. In so doing, UWB is able to transmit more data in a given period of time than the more traditional technologies. RF design engineers typically have little control over the bandwidth parameter, because this is dictated by FCC regulations that stipulate the allowable bandwidth of the signal for a given radio type and application. Bluetooth Technology, 802.11a/g Wi-Fi, cordless phones, and numerous other devices are relegated to the unlicensed frequency bands that are provided at 900 MHz, 2.4GHz, and 5.1 GHz.

Each radio channel is constrained to occupy only a narrow band of frequencies, relative to what is allowed for UWB. UWB radios can use frequencies from 3.1 GHz to 10.6 GHz. Each radio channel can have a bandwidth16□□of more than 500 MHz, depending on its center frequency. To allow for such a large signal bandwidth, the FCC put in place severe broadcast power restrictions. By doing so, UWB devices can make use of an extremely wide frequency band while not emitting enough energy to be noticed by narrower band devices nearby, such as802.11a/g radios. This sharing of spectrum allows devices to obtain very high data throughput, but they must be within close proximity.

Strict power limits mean the radios themselves must be low power consumers. Because of the low power requirements, it is feasible to develop cost effective CMOS implementations of UWB radios. With the characteristics of low power, low cost, and very high data rates at limited range, UWB is positioned to address the market for a high-speedway. UWB technology also allows spectrum reuse.

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