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APPLICATION OF ULTRA WIDE BAND TECHNOLOGY

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Ultra-WideBand is a high data rate, low power short-range wireless technology, considered as a high-speed alternative to existing wireless technologies.

Ultra Wide Band technology is a wireless technology to transmit large amounts of digital data as modulated coded impulses over a very wide spectrum of frequency with very low power for a short distance. Pulsed transmission is an alternative to sinusoidal waves traditionally used in wireless communications [1].

This new technology supports direct transmission of digital information as a baseband signal rather than modulating the information within a sinusoidal carrier. Typical duration of the pulse lasts from a few tens of picoseconds to a few nanoseconds. As the bandwidth is inversely proportional to pulse duration, the spectral extent of these waveforms is very large (Fig. 1).

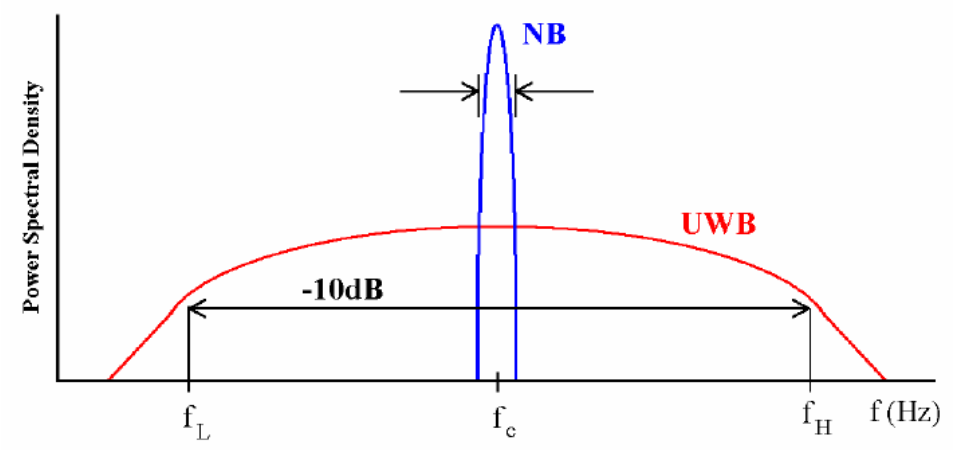

Fig. 1. SpectrumUltra Wide Band signal

Due to low energy density UWB signals cause minimal interference if operated on spectrum already occupied by existing radio services. However, the level of interference of UWB signals is still under research [5].

UWB technology has many benefits over the existing wireless technologies [3]:

- Very high speed due to high-bandwidth multi-channel performance.
- Extremely easy and cheap transceivers to compare to typical spread spectrum ones due to UWB low power and short burst radio impulse requirements. Both UWB transmitters and receivers consist of integrated CMOS which makes them affordable for consumers.
- UWB systems also consume very little power, around one tenthousandth of that of cell phones. This makes UWB practical for use in smaller devices, such as cell phones and PDAs.
- Ability to share frequencies with other services without causing harmful interference.
- High flexibility for the adaptation of a frequency. UWB systems could be positioned anywhere in the RF spectrum.
- Low power causes less interference than conventional radio networks. Relatively wide spectrum of UWB waves results in less interference from other systems.
- Ability to propagate effectively through materials such as cement and brick.
- Excellent frequency diversity and multipath resolution.
- Exceptional performance in multipath reflective environments, which can be helpful in high precision positioning.
- Low probability of intercept and detection (LPI/D) due to low power densities.
- Reduced fading even in dense high multipath channels (indoor environment).

- Common architecture for communications, radar and positioning systems.

There are a wide number of applications that UWB technology can be used for. They range from data and voice communications through to radar and tagging. With the growing number of way in which wireless technology can be used, the list is likely to grow [4].

Commercial:

- High speed LAN / WAN (>20 Mbps)
- Avoidance radar
- Altimeter (aviation)
- Tags for intelligent transport systems
- Geolocation

Military:

- Radar
- Covert communications
- Intrusion detection
- Precision geo-location
- Data links

Ultra-wideband characteristics are well-suited to short-distance applications, such as PC peripherals. Due to low emission levels permitted by regulatory agencies, UWB systems tend to be short-range indoor applications (Fig. 2). Due to the short duration of UWB pulses, it is easier to engineer high data rates; data rate may be exchanged for range by aggregating pulse energy per data bit (with integration or coding techniques). Conventional orthogonal frequency-division multiplexing (OFDM) technology may also be used, subject to minimum-bandwidth requirements. High-data-rate UWB may enable wireless monitors, the efficient transfer of data from digital camcorders, wireless printing of digital pictures from a camera without the need for a personal computer and file transfers between cell-phone handsets and handheld devices such as portable media players [3].

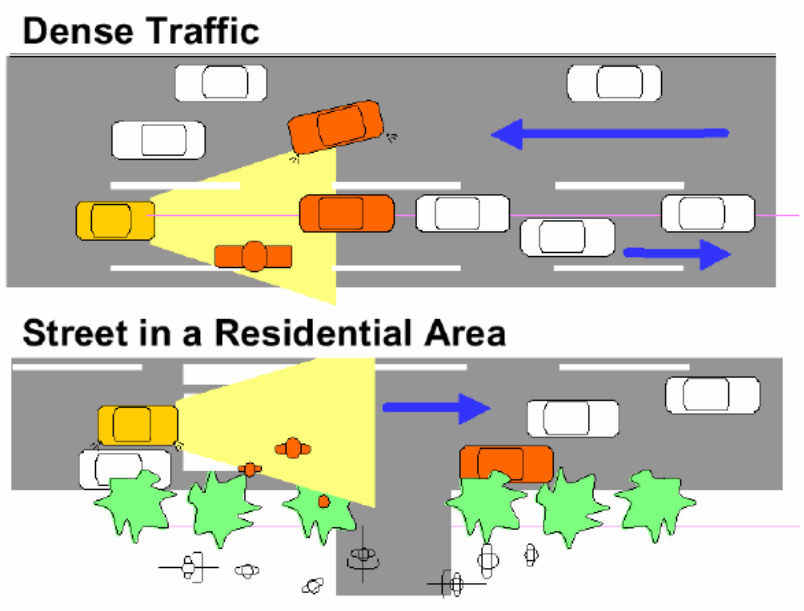

Fig. 2. Application UWB technology for objects that have fallen onto subway tracks

Ultra-wideband is also used in "see-through-the-wall" precision radar-imaging technology, precision locating and tracking (using distance measurements between radios), and precision time-of-arrival-based localization approaches. It is efficient, with a spatial capacity of approximately 1013 bit/s/m² (Fig. 3). UWB radar has been proposed as the active sensor component in an Automatic Target Recognition application, designed to detect humans or objects that have fallen onto subway tracks [5].

With the growing level of wireless communications, ultra wide band UWB offers significant advantages in many areas.

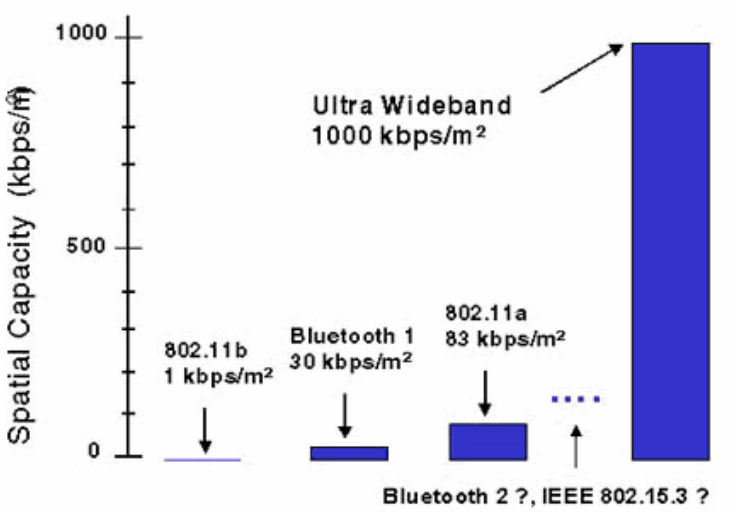

Fig. 3. Analysis spatial capacity

One of the main attractions for WAN / LAN applications is the very high data rates that can be supported. With computer technology requiring ever increasing amounts of data to be transported, it is likely that standards such as 802.11 and others may not be able to support the data speeds required in some applications. It is in overcoming this problem where UWB may well become a major technology of the future.

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TOWN COUNCIL AS A BODY OF MUNICIPAL GOVERNMENT IN VITEBSK AND POLOTSK IN THE SECOND HALF OF THE 19TH CENTURY

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The article is devoted to the activities of the town council as the executive body of the municipal government in Vitebsk and Polotsk in the second half of the nineteenth century.The structure of the councils is analyzed.The significant attention is drawn to the competence of the permanent commissions of the town councils.

On June 16, 1870 Alexander's II government established the "City Regulations" which a new system of municipal government was based on. The self-government system consisted of the electoral assembly, City Duma and the administrative board of the city. Management function belonged to the Duma. Public members of the Duma and members of the town council were elected for 4 years. Municipal government was headed by the mayor, who like the members of the council, elected by City Duma. "City Regulations" were based on the all-