

Parco Wireless

Ultra-Wideband Radio
Details

UWB Applications in Healthcare
December 2003

3 Primary Distinctions

1. “Mother” of All Spread Spectrum
2. Ultra-fast rise time on pulses
3. Ultra-low power output

Spread Spectrum

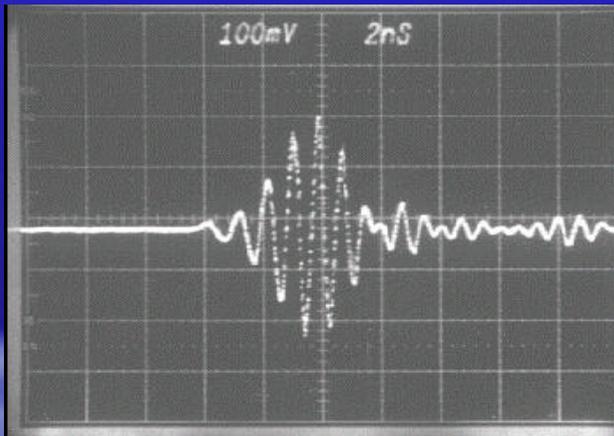
- Similar:
 - Generating negligible amount of energy within the intercept receiver's acquisition bandwidth.
- Distinction:
 - The spread bandwidth for UWB is generated directly
 - The spread bandwidth is not modulated with a separate spreading sequence such as PN code or hopping patterns

UWB as a *Time-Domain* concept

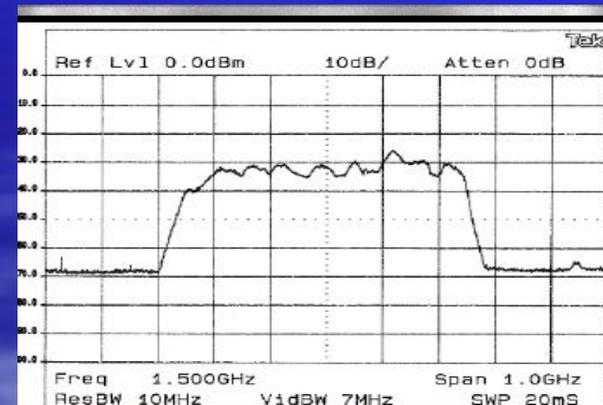
- Extremely short RF pulse
 - Results in a very wide instantaneous bandwidth signal
 - B/C direct Fourier transform relationship between **time** and **frequency**

Pulse Shape and Power

L-Band UWB Pulse



Power Spectral Density



Note: Pulse is same shape and length at C-Band 6-7 GHz

This is peak power example

Benefits: Fast Rise Time

- LPI/D
 - Low Probability of Intercept/Detect
- Majority of Intercept Receivers
 - aka. Medical monitoring equipment, eavesdroppers, warchalking
 - Unable to respond to the short duration pulse

Benefit: Ultra-Low Power

- LPI/D
- Extremely low average power density of a UWB signal
- 1 watt peak power device @ 10 kHz PRF
 - 10^{-5} typ duty cycle for average power of 10 μ W
 - **Current** operations at 10 gigapulses per second
 - 250 μ W peak @ 1 μ W average

PRF: Pulse Repetition Frequency μ W: microwatt (1,000,000 μ W = 1 W)

IP Advantages

- Our receivers use time gating
 - Technique provides noise-blanking
 - Makes our UWB radios jam proof
 - Nice way of saying we can't be interfered with...
 - Very effective in the presence of in-band CW
- Responds only to the leading edge of the pulse
- Simplicity/Commonality of high level circuit design
 - Attractive candidate from cost/performance perspective
 - Same circuit for communication and positioning

in-band CW = intentional barrage noise jamming

IP Advantages

- RF/Microwave Circuitry is minimal
 - NO frequency synthesizers
 - NO up/down converters
 - NO image rejection filters
- Frequency adaptive designs are rapidly achieved
 - Only change antenna and noise amplifier
- Design is all **digital**
- **Low Cost**
- Small Package Size
- Long Life

Parco UWB Advantages

- Extremely LPI/D
- High Anti-jam immunity
- Frequency Diversity with min. mods
- Commonality of signal generation and processing architecture
- Low Cost Components and Assembly
 - All Digital with minimal RF/Microwave Circuitry

Presenter Info

- Parco Wireless, Portland Maine
 - 4 Years Commercial Operations
 - First UWB provider to Healthcare, Safety and Emergency Support Services
 - Infrastructure Provider
 - Manufacturer
- Scott Cohen, CEO & Co-Founder
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