

Integrating Impulse Radio Receiver

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Content

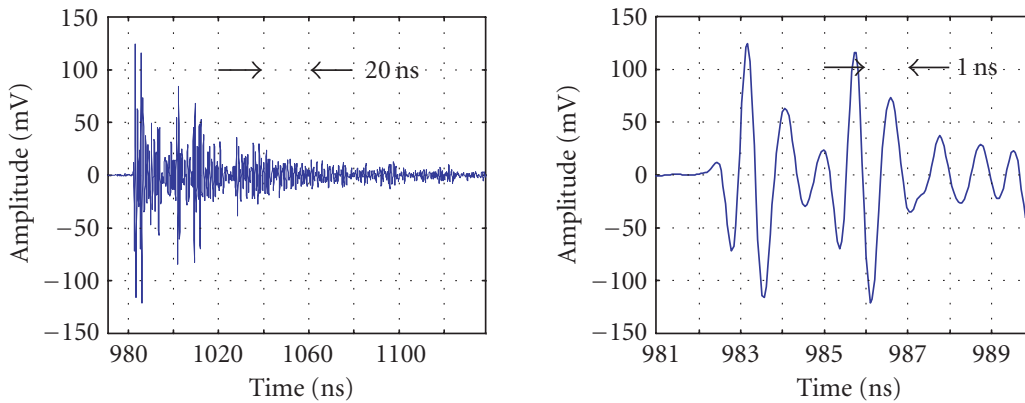
- 1 UWB-IR communications physical layer
 - UWB-IR communications
 - PHY

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Why UWB communications?

- Transmitter: Low power, simple.
- More energy efficient than narrow band: $C = B \log_2 \left(1 + \frac{S}{N} \right)$.
- Multipath = copies of signal = more received energy (narrow band: constructive / destructive interference).
- Not sensitive to problems at distinct frequencies:
 - Intereference from other sources.
 - Channel attenuation.



(c) Typical indoor received signal, clear line-of-sight.

Figure: Multipath.

[Ultra-Wideband Radio, Scholtz et al., EURASIP Journal on Applied Signal Processing 2005:3, 252-272]

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UWB-IR PHY

- Based on PHY proposal for IEEE 802.15.4a (WPAN Low Rate) by Time Domain.
- The idea: Use sampling principle from radar for symbol detection. Operate in stochastic resonance region.

January 2005

doc.: IEEE 802.15-05-0013-01-004a

Multiple chips make a symbol:

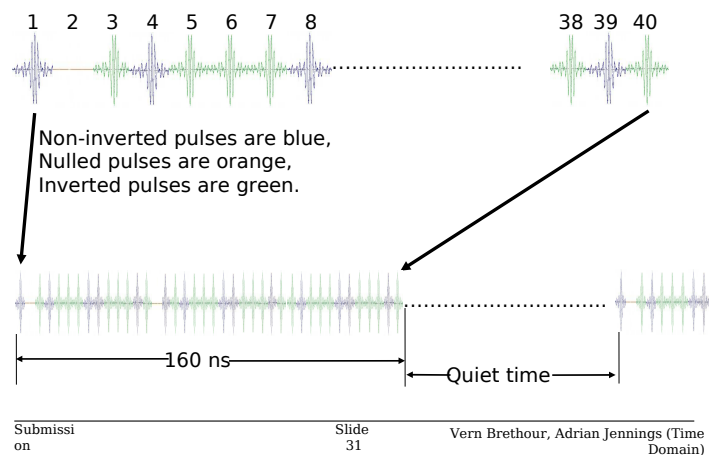


Figure: Time Domain PHY proposal

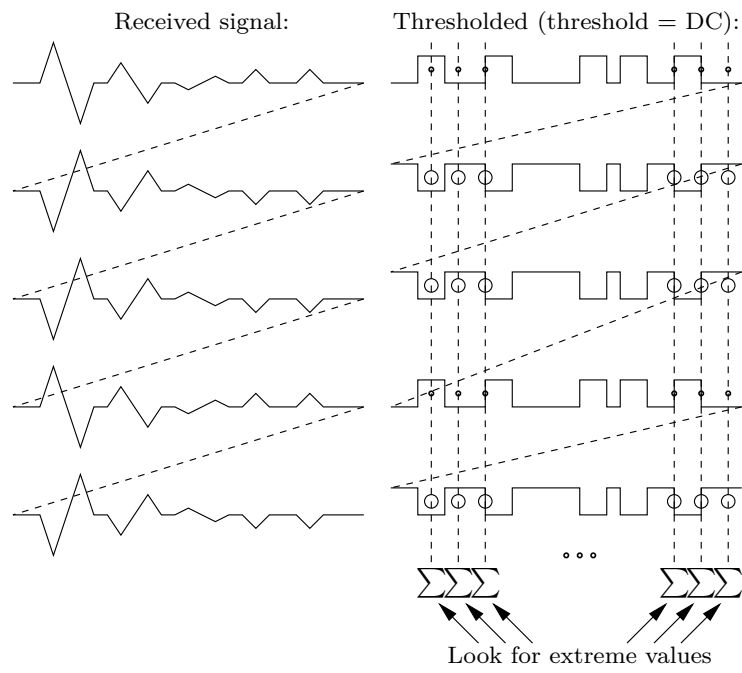


Figure: PHY concept