A New Energy Efficient MAC protocol with Noise Based Transmitted Reference Modulation for Wireless Sensor Networks
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1. Transmitted Reference (TR) modulation
- Both modulated and unmodulated signals are sent
- Identified at receiver by time or frequency offset
- Demodulation by self-correlation
- Multiple access by using different offsets

2. Why a new energy efficient MAC protocol?
- TR modulation uses more transmission power for individual bits
- Early data transmission without long preamble
- Using energy harvesting gives new requirement

3. New MAC protocol: Three states
- First time communication
  - Adapt wake up cycle
  - Synchronized Link
  - Remember wake up time
  - Unsynchronized Link
  - Neighbor discovery
  - Exchange MAC Address
  - Establish link identifier (Offset)

4. Timing diagram: Unsynchronized Link
- Data can be sent right away since TR modulation does not need long preamble
- Link identifier can be derived from link offset
- Transmitter sends data-listen bursts
- Receiver acknowledges after receiving a data burst
- Overhearer goes back to sleep

5. Timing diagram: Synchronized Link
- Both transmitter and receiver can store each other’s next wake up time
- Transmission can be either transmitter-driven or receiver-driven based on available energy
- Duty cycle can be adapted based on requirement

Vision:
Design an energy efficient MAC protocol for robust noise-based radio link using low-power ICs

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