

# Wake-up Flooding: An Asynchronous Network Flooding Primitive

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## > Motivation

### Rare Event Dissemination

- Rapid, on-demand, event dissemination through multi-hop network e.g. medical & structural monitoring, home & industrial automation, etc.

### Common Approach:

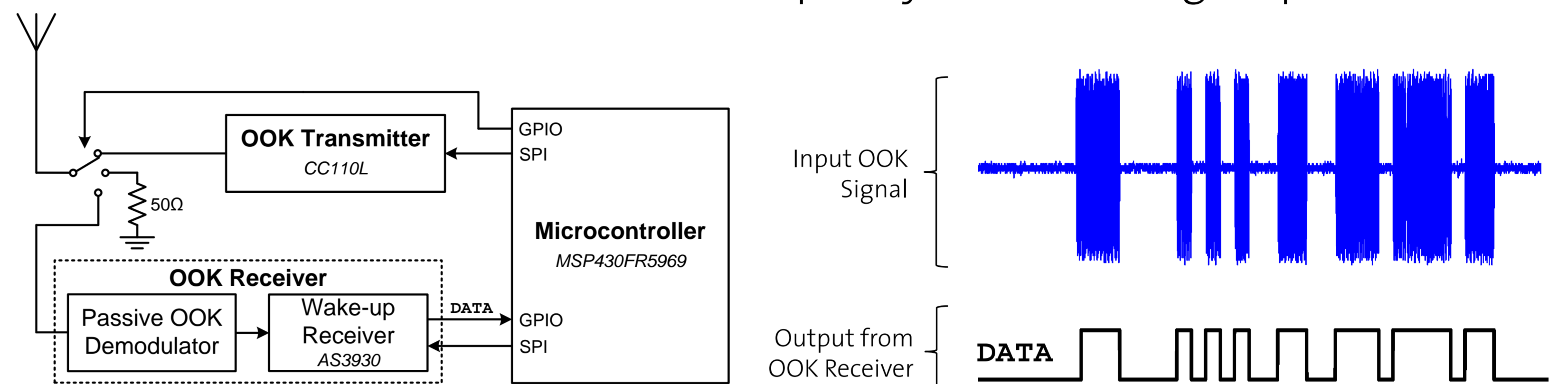
- Duty-cycled Protocols: (asynchronous / synchronous) → Design trade-off: mote lifetime vs. end-to-end latency
- Backscatter Technologies: (dedicated / ambient) → Design trade-off: energy vs. network connectivity

### Our Solution:

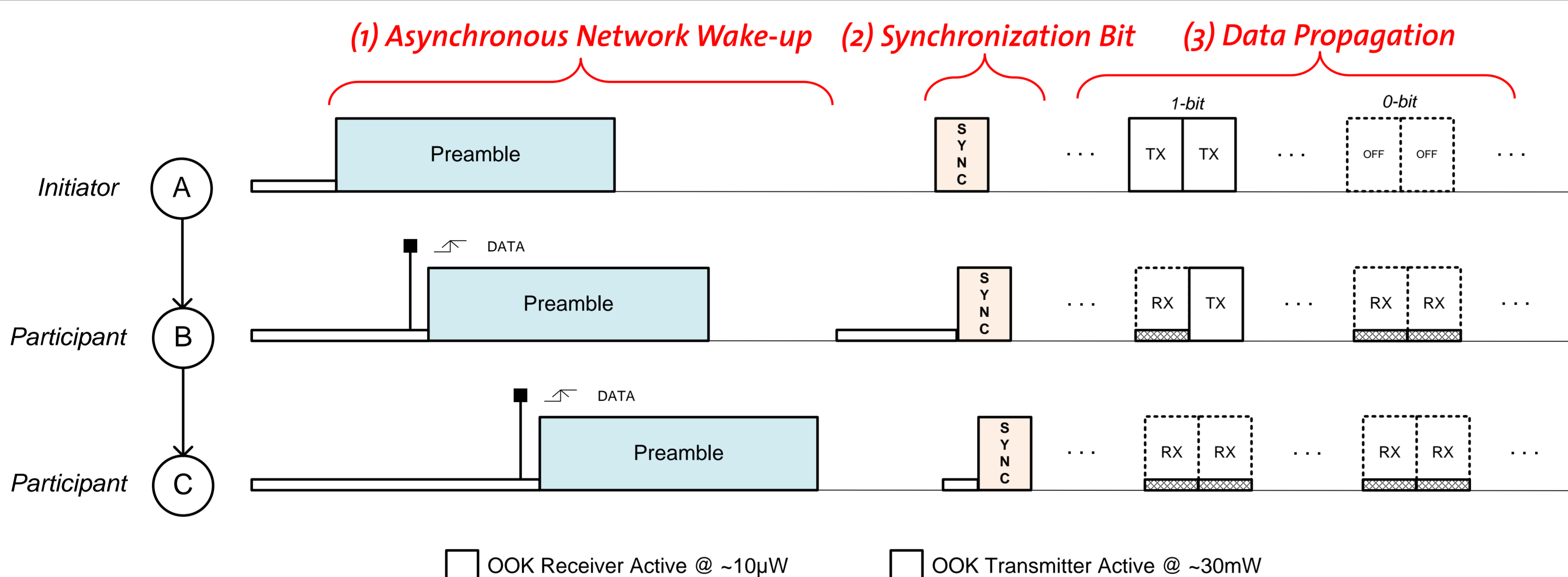
- Exploit state-of-the-art low-complexity radio hardware

### Low-complexity OOK Receivers:

- Ultra-low power, always-on, low-complexity receiver
- Leveraging On-Off Keying (OOK) modulation
- Acoustic, radio-frequency, and visible light spectrums



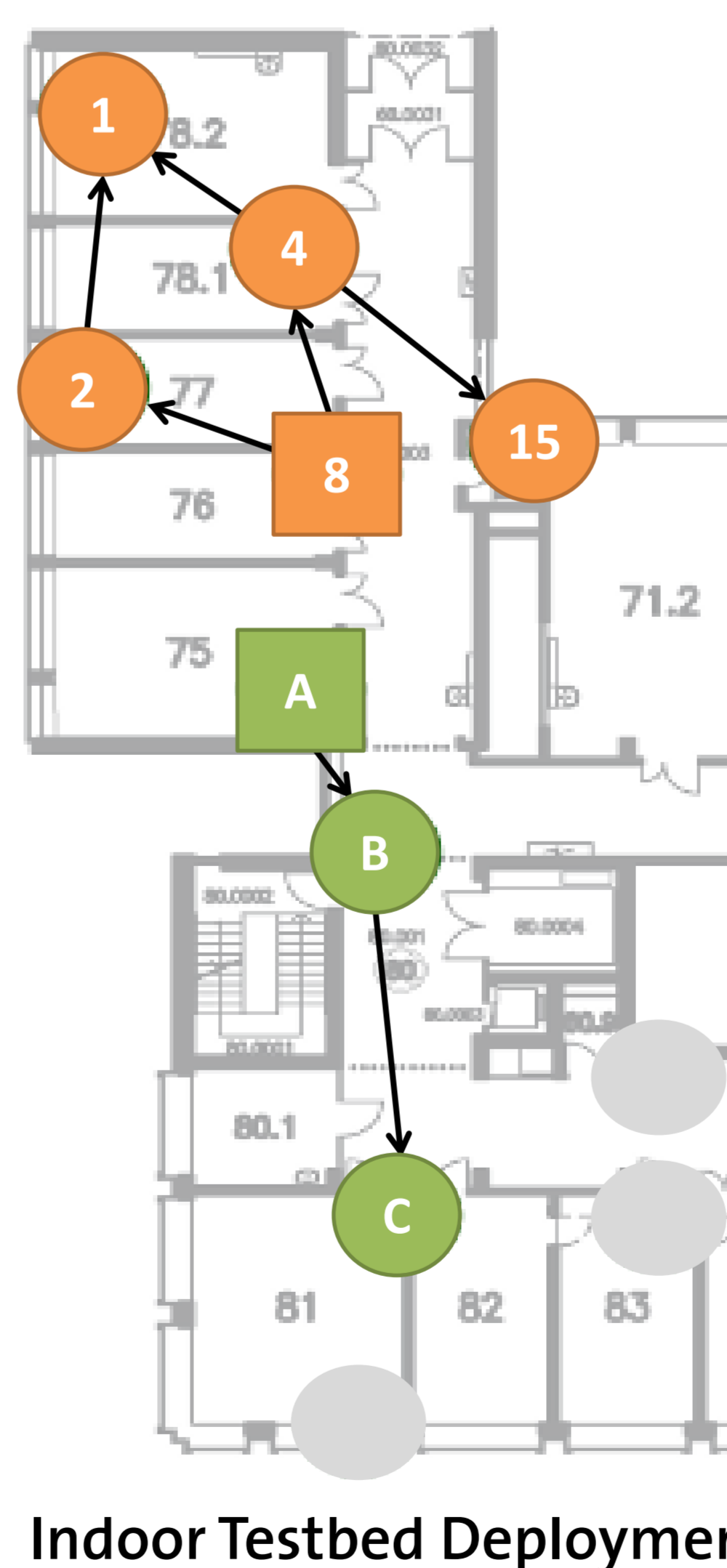
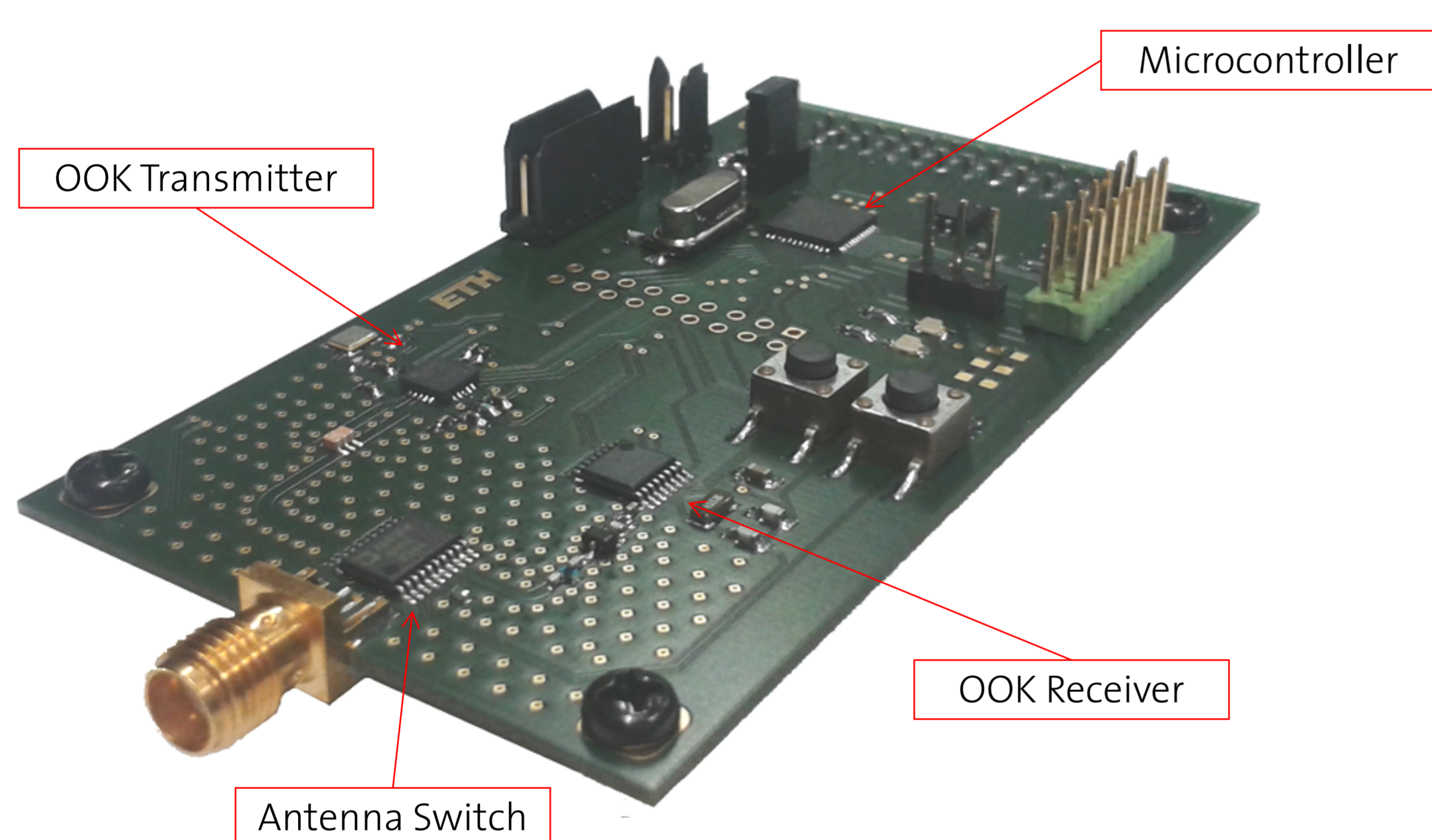
## > Wake-up Flooding Overview



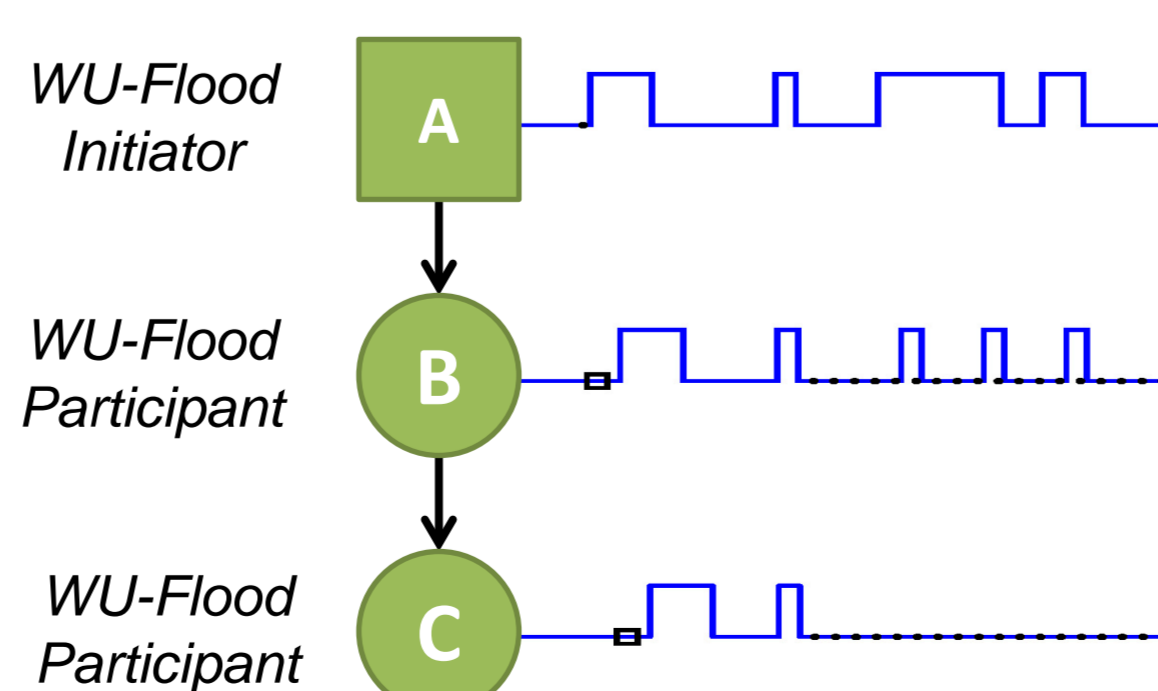
Wake-up Flooding consists of three phases:

1. **Asynchronous Network Wake-up**  
...to wake-up all motes from deep sleep
2. **Synchronization Bit**  
...to time-synchronize each hop
3. **Data Propagation**  
...to flood data through network

## > Experimental Evaluation

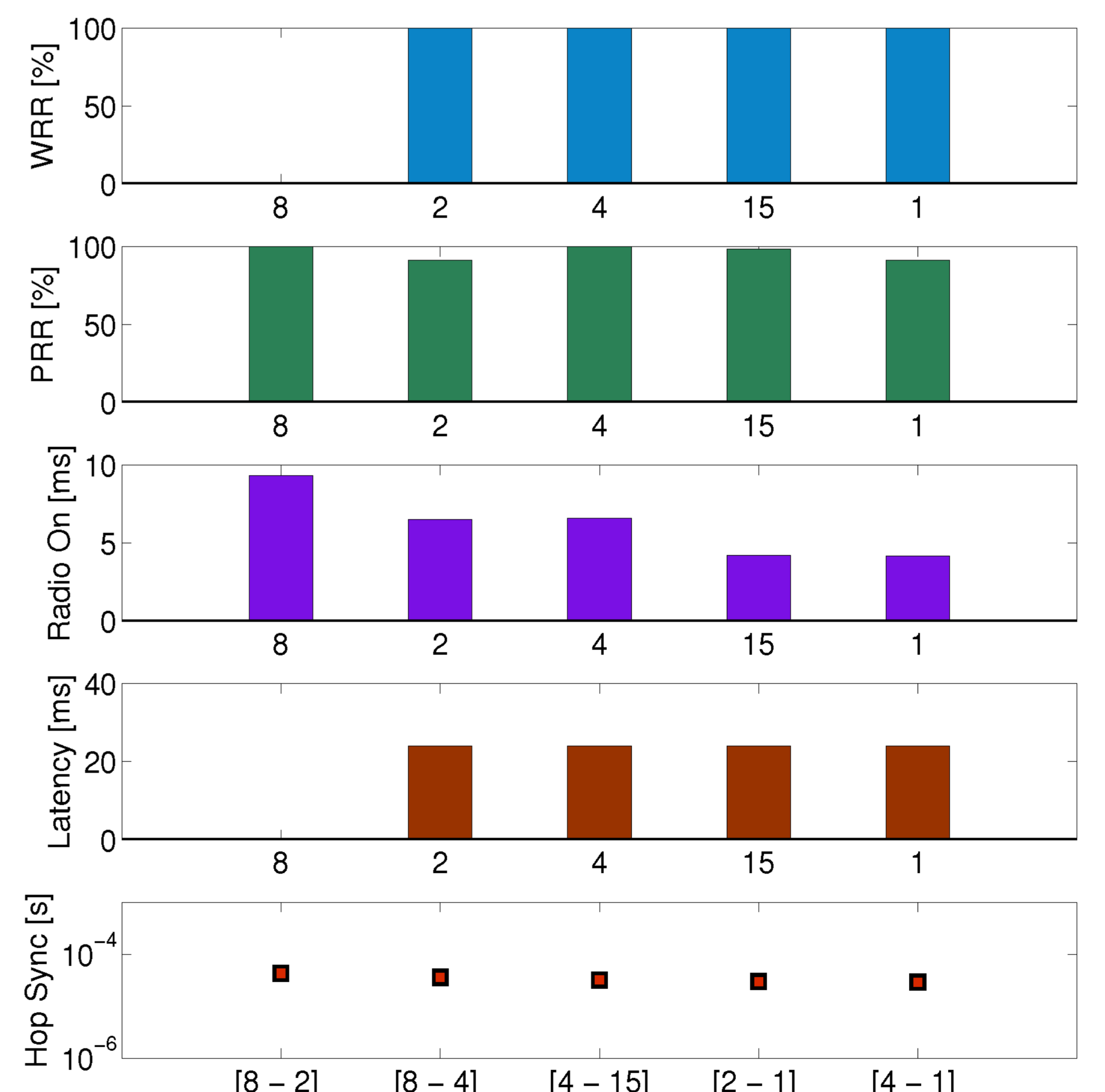


Indoor Testbed Deployment



### Preliminary Results:

- Power dissipation during inactivity < 10µW
- Average per-hop synchronization ≈ 50µs
- End-to-end latency < 50ms



### Prototype Wireless Sensor Platform:

- Compact single-antenna design compatible with FlockLab
- Ultra-low power OOK receiver with -51dBm RX sensitivity
- State-of-the-art 16-bit microcontroller with built-in FRAM

### Additional Features:

- Constant end-to-end-latency for all motes
- Topology-dependent OOK transmission time
- Decoding of hop-count during data propagation