

## MOTIVATION – TO DESIGN A DEPENDABLE PROTOCOL

- Quality of Service (QoS) provision in Wireless Sensor Networks (WSNs) is extremely challenging because of:
  - resource constraints of sensor nodes
  - harsh interference in practical applications
  - unknown network topology
  - various traffic pattern, e.g., heavy or light, periodic or burst
- Stringent QoS metrics are required for mission-critical applications, e.g., in wireless industry, smart grids, cooperative driving, etc.
  - high reliability

- low latency
- high energy efficiency
- high robustness against interference
- Our goal is to design a dependable protocol which is able to work under harsh interference and performs as **reliably** as possible under various scenarios (i.e., different traffic, different payload length).

## SOLUTION – DECoT+

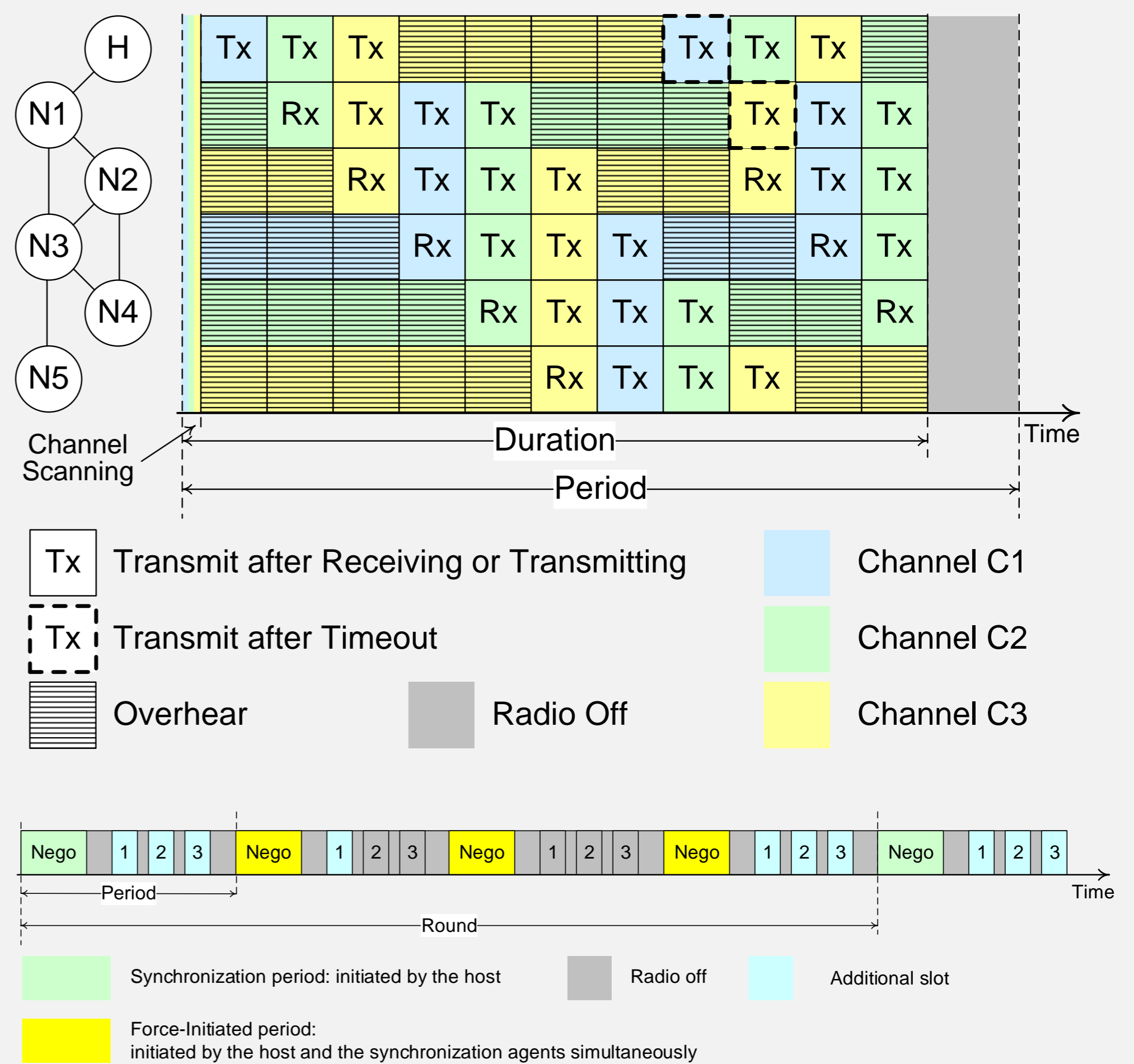
DeCoT+ is based on DeCoT [4], a dependable concurrent transmission-based protocol for WSNs. It has several mechanisms to achieve dependable communication.

### Design of DeCoT+

- Multi-channel hopping: Scan-and-Lock mechanism
  - \* OF $\partial$ COIN [3] and Enhanced OF $\partial$ COIN (eOF $\partial$ COIN) [5]
  - \* maintain usable links under interference
- Force-Initiated mechanism
  - \* eOF $\partial$ COIN
  - \* decentralize the network
- Nego-and-Action mechanism
  - \* a framework designed for dependable WSNs
- Freezing mechanism
  - \* node restores the forwarded packet and initiates with this packet in the next additional slot

### Implementation

- Operating system: Contiki [1]
- Simulation: Cooja simulator
- Sensor nodes: TelosB
- Testbed: FlockLab [2]



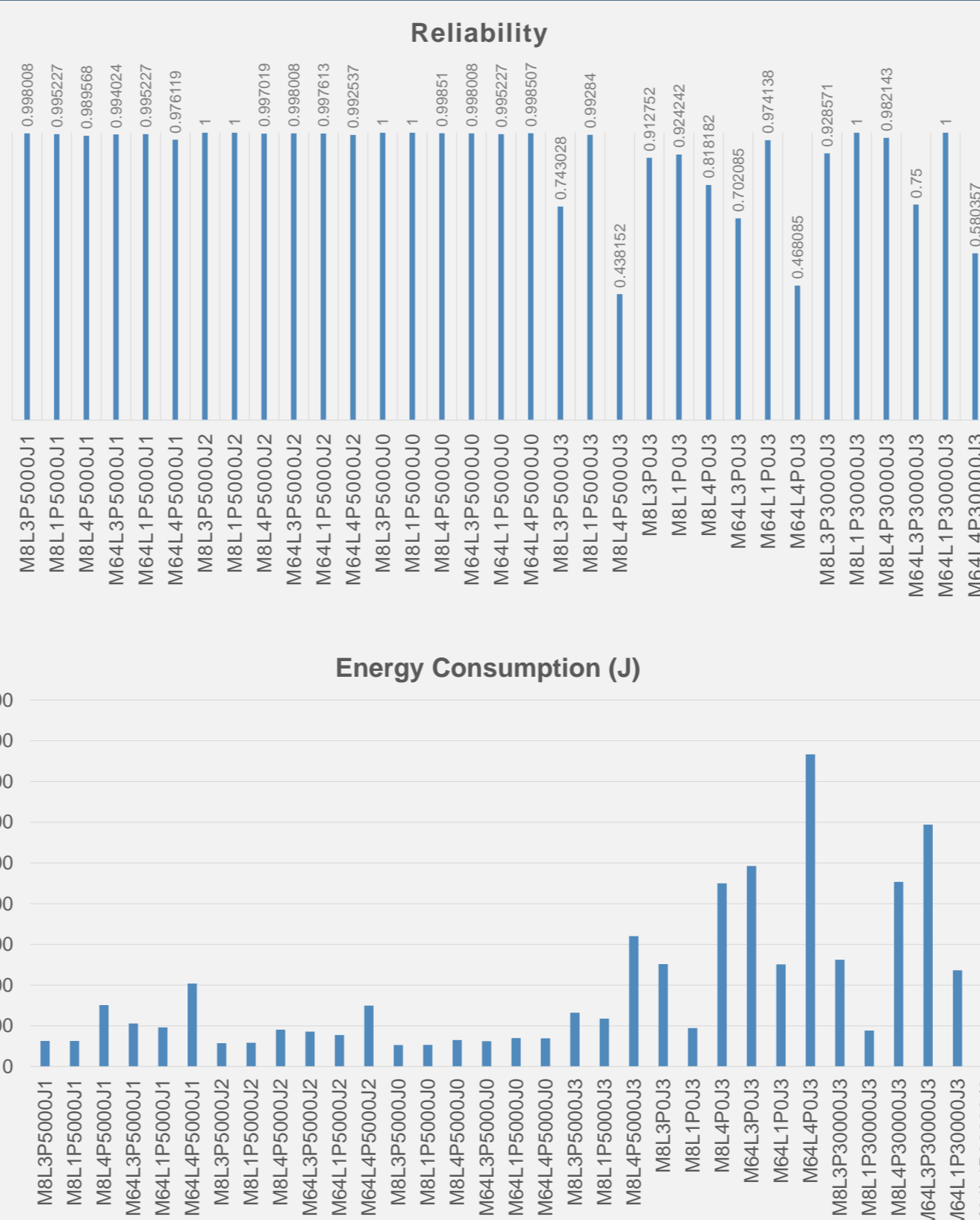
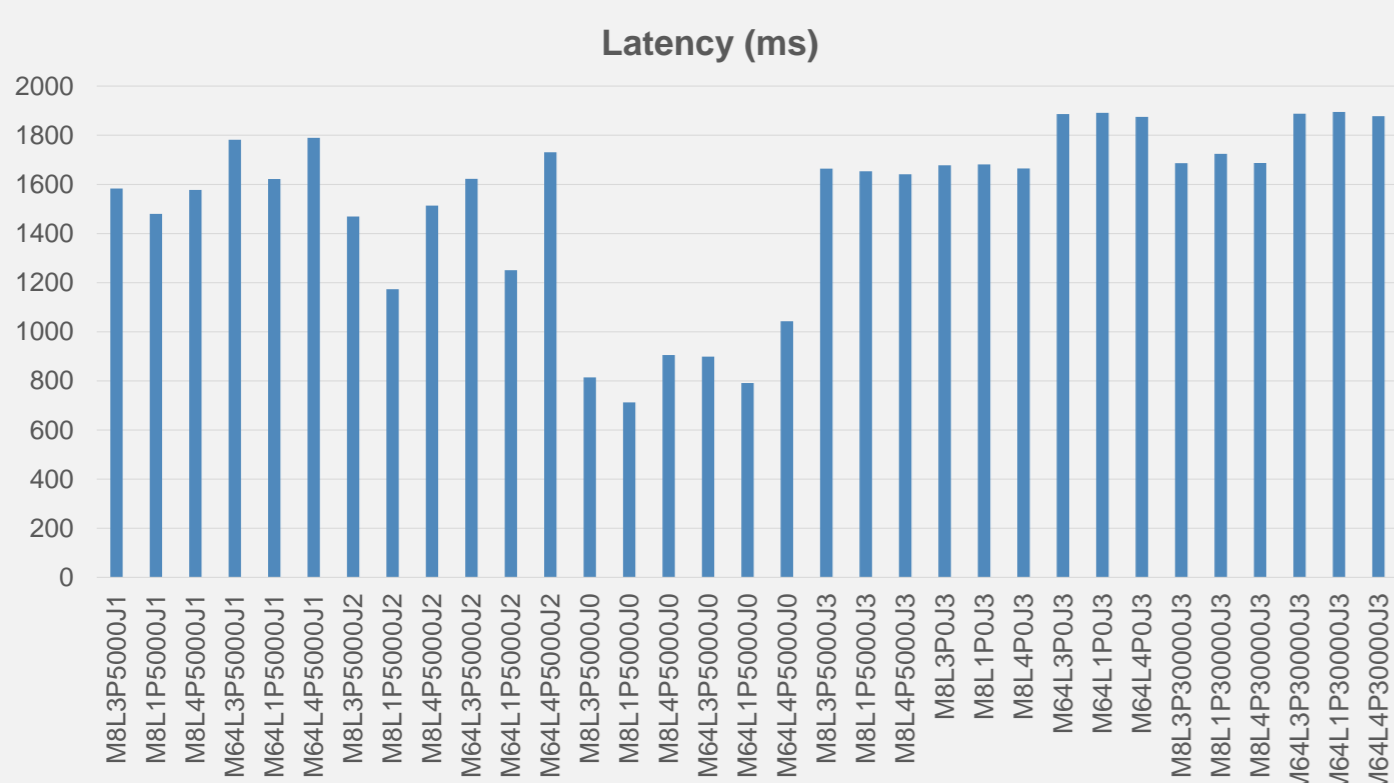
## EXPERIMENTAL EVALUATION

### Evaluation

- Testbed: D-Cube [6]
  - Exp. duration: 480 s
  - Performance metrics
    - \* reliability
    - \* latency
    - \* energy consumption
- L: layout  
– P: periodicity (ms)  
– J: interference level

### Legend

- M: message length (B)



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