A Simple and Efficient MAC-Routing Integrated Algorithm for Sensor Network

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Outline

- Introduction
- The Proposed Algorithm
- Simulation
- Conclusion

Introduction

♦ Sensor networks
- ☑ Messages transmission could be multi-hop
  – By using intermediate sensors as relay
- ☑ Battery limitation
- ☑ Optimizing the whole network battery life

Introduction (cont.)

- GeRaF[5]
  - ☑ Two radios is used
  - ☑ When a node has a packet to send, it listens both the frequencies
    - Either is active
      - The node goes in back off
    - Both are inactive
      - The node starts the transmission
- Disadvantages
  - ☑ It uses two radio channels

The proposed algorithm

♦ Transmitter

♦ Receiver

♦ Collision Avoidance Scheme
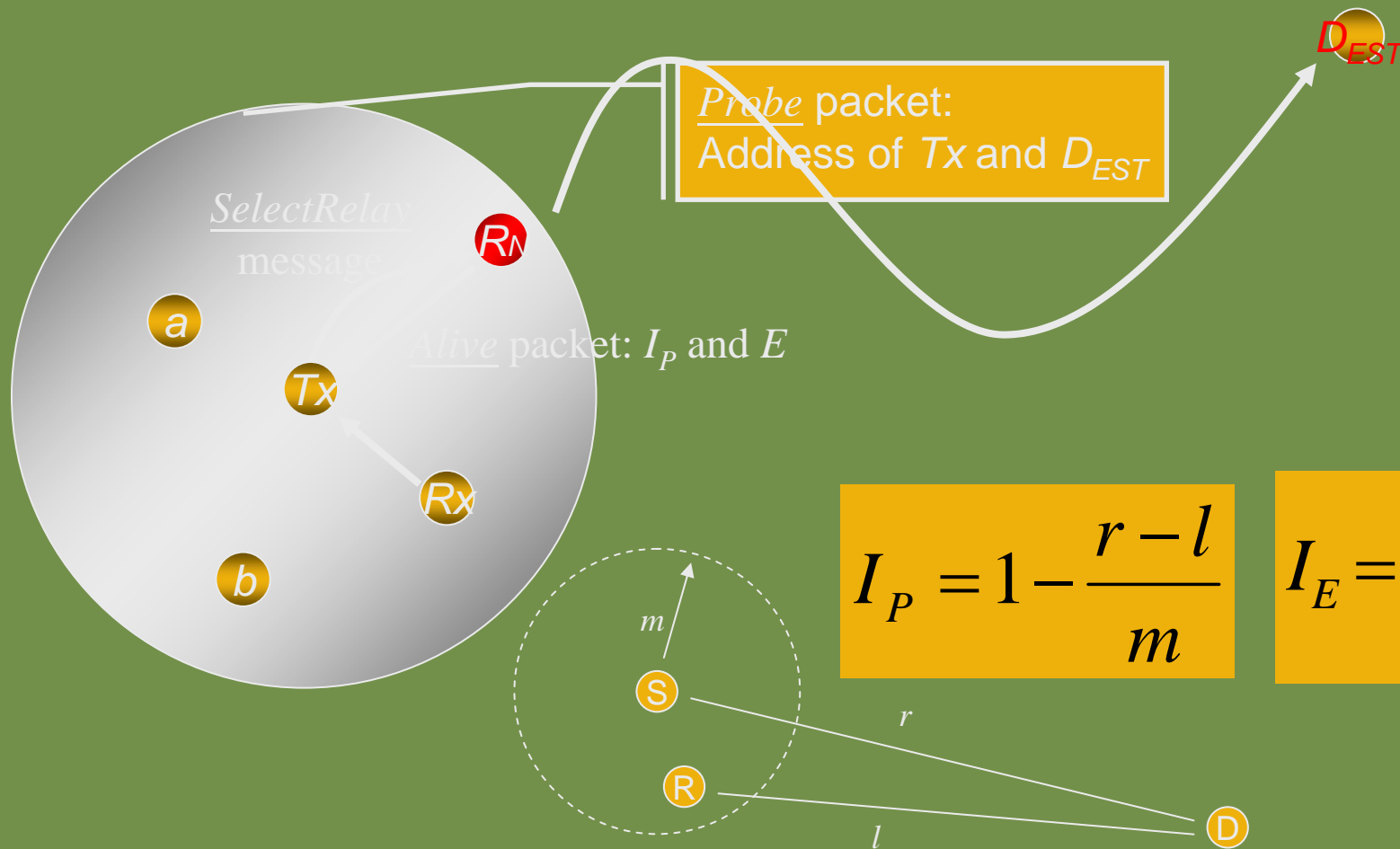
♦ Last Hop

♦ Routing Algorithm

The proposed algorithm

- ◆ Assumption
    - ☑ the positions of the sensor nodes are fixed
    - ☑ coordinates are directly linked to their addresses
- ◆ T_X: the node which has a packet to transmit
- ◆ R_X: nodes that are in the condition to work as relay for T_X
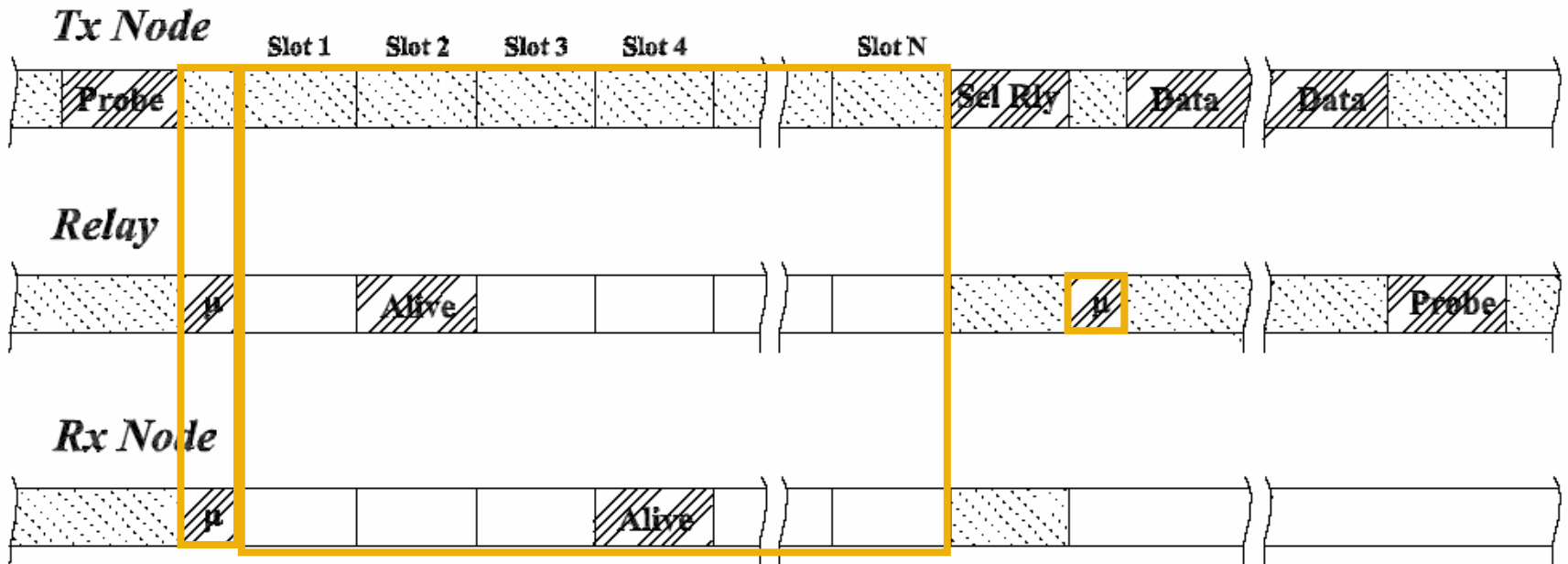- ◆ R_N: is the selected relay node
- ◆ D_{EST}: is the destination node

The proposed algorithm

D_{EST}

Probe packet:
Address of Tx and D_{EST}

SelectRelay
message

a

Tx

Alive packet: I_P and E

Rx

b

R_N

m

S

r

R

l

D

$$I_P = 1 - \frac{r - l}{m}$$

$$I_E = \frac{E - E_{Min}}{E_{Max} - E_{Min}}$$

The proposed algorithm

Legend:

▨	: Node is Transmitting
▨	: Node is Listening
▢	: Node is Sleeping

The proposed algorithm: **last hop**

Probe Packet: Address of *Tx* and D_{EST}
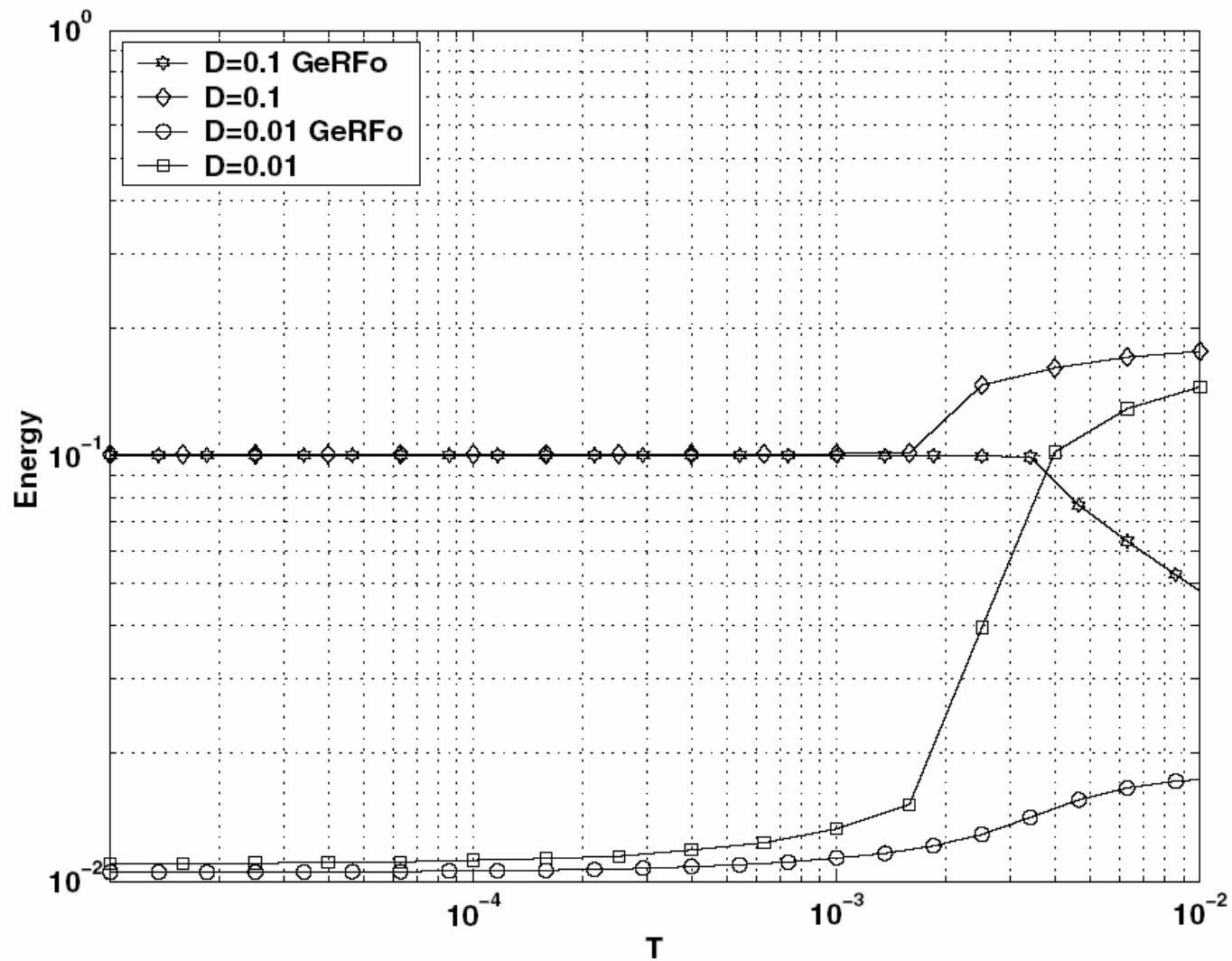
Rx   Rx

Tx

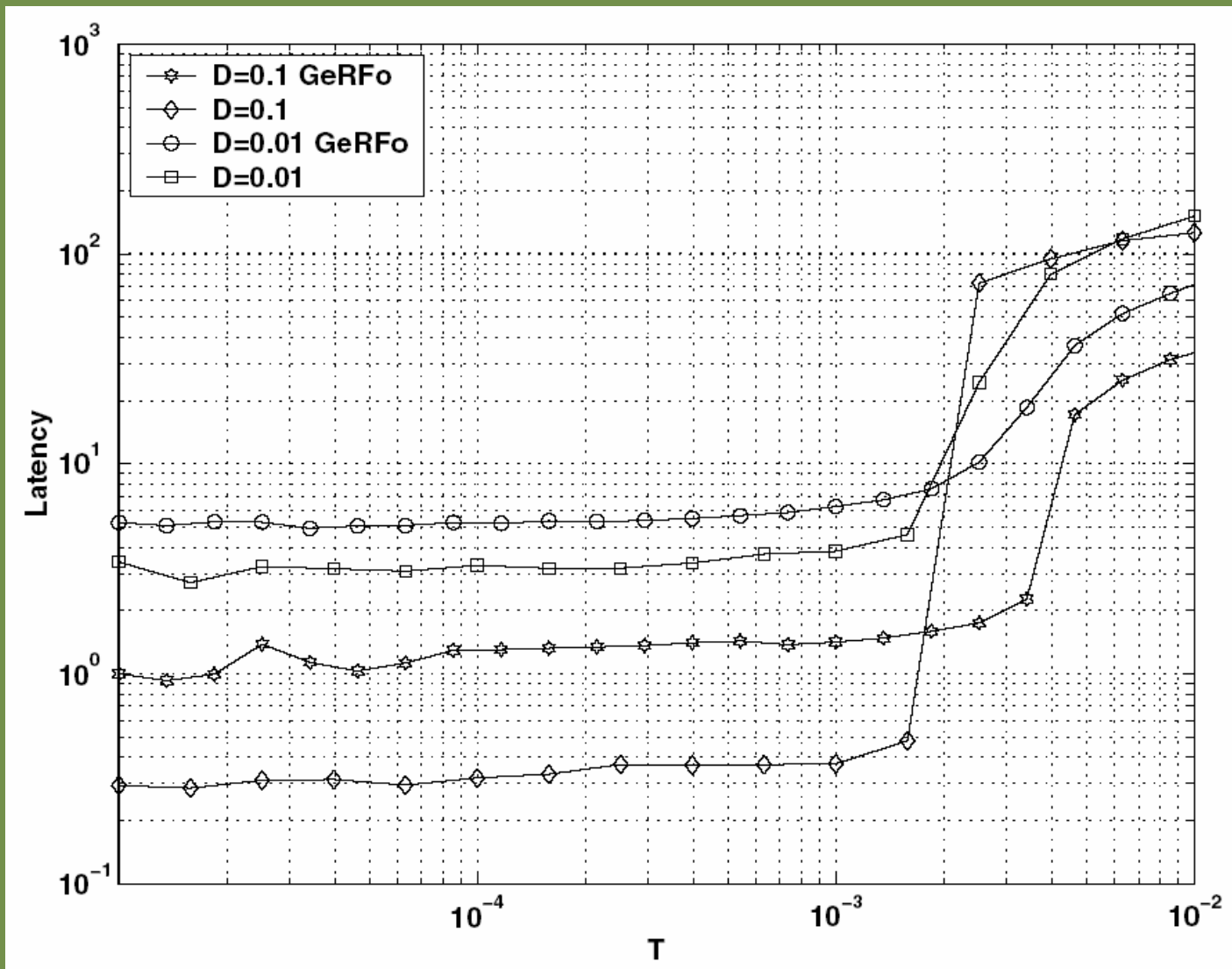"Dummy" *Probe*

D_{SET}

Rx
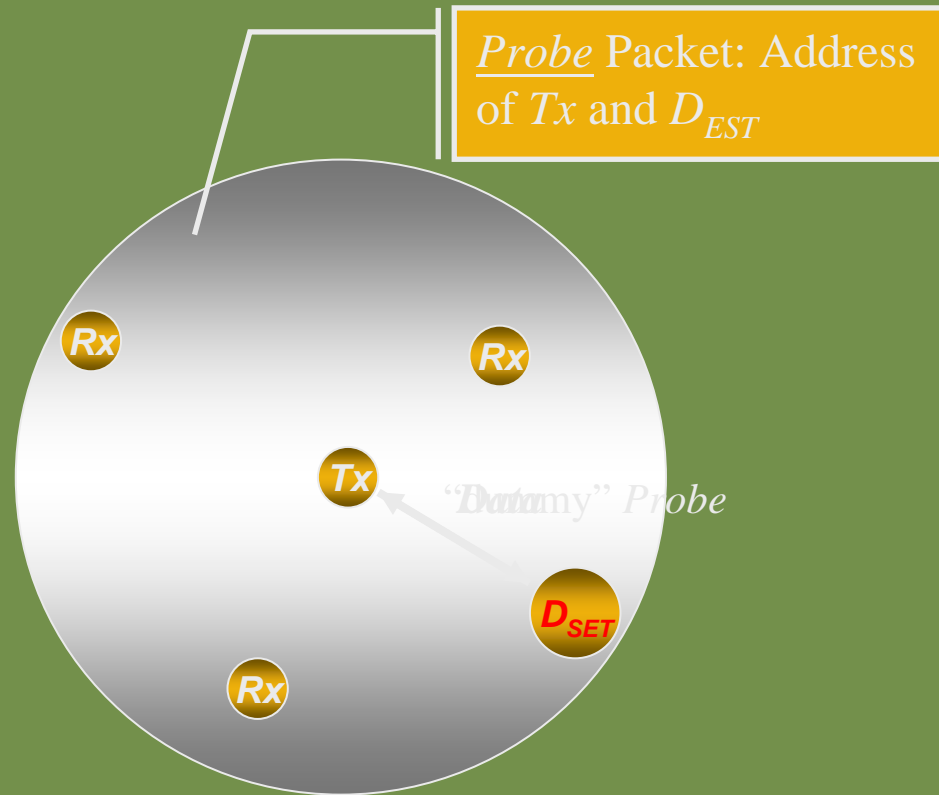
The proposed algorithm: last hop
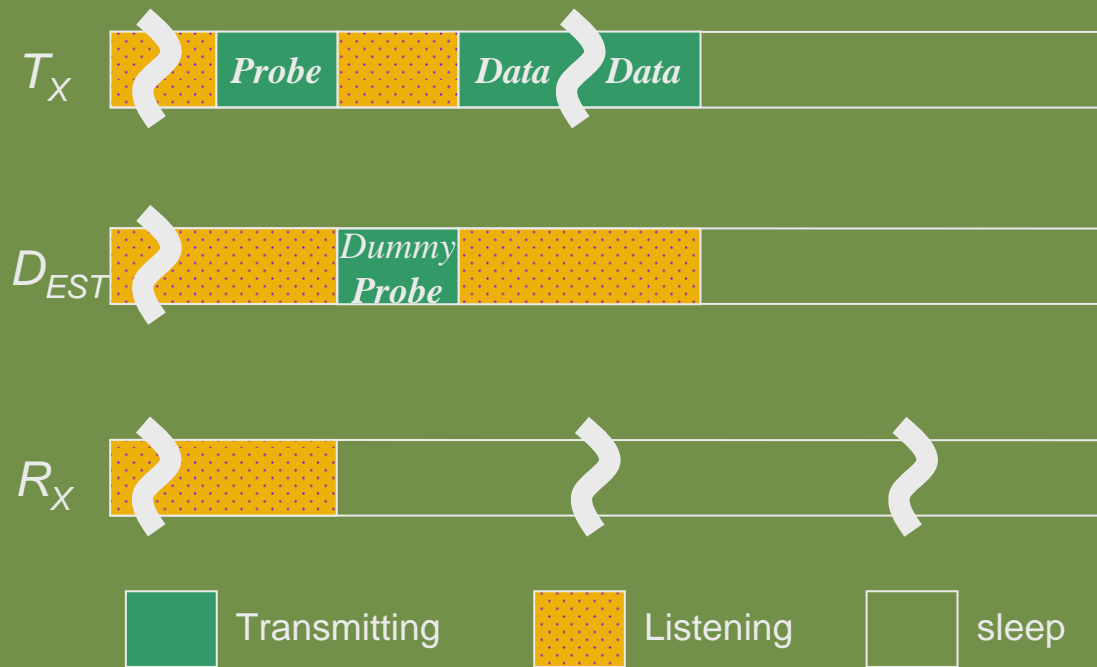
Simulations

- Simulator is written in C
- Network size: 400m*400m
- The whole network traffic: $T = \lambda N T_{DATA}$
- Data packet: $1000 bits$
- μpacket: $10 bits$
- Radio's bit rate: $19200 Kbps$
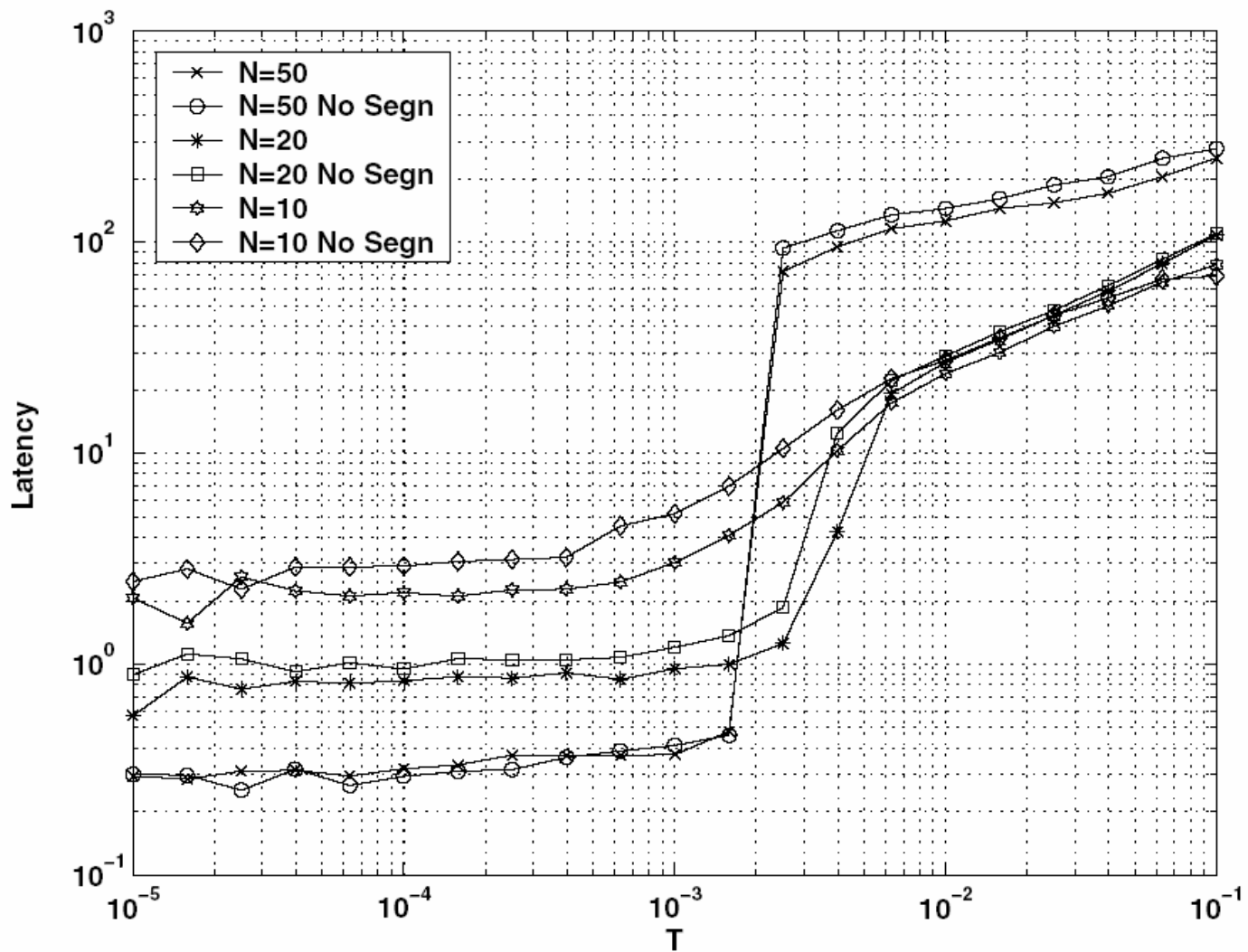- With a range: 50m
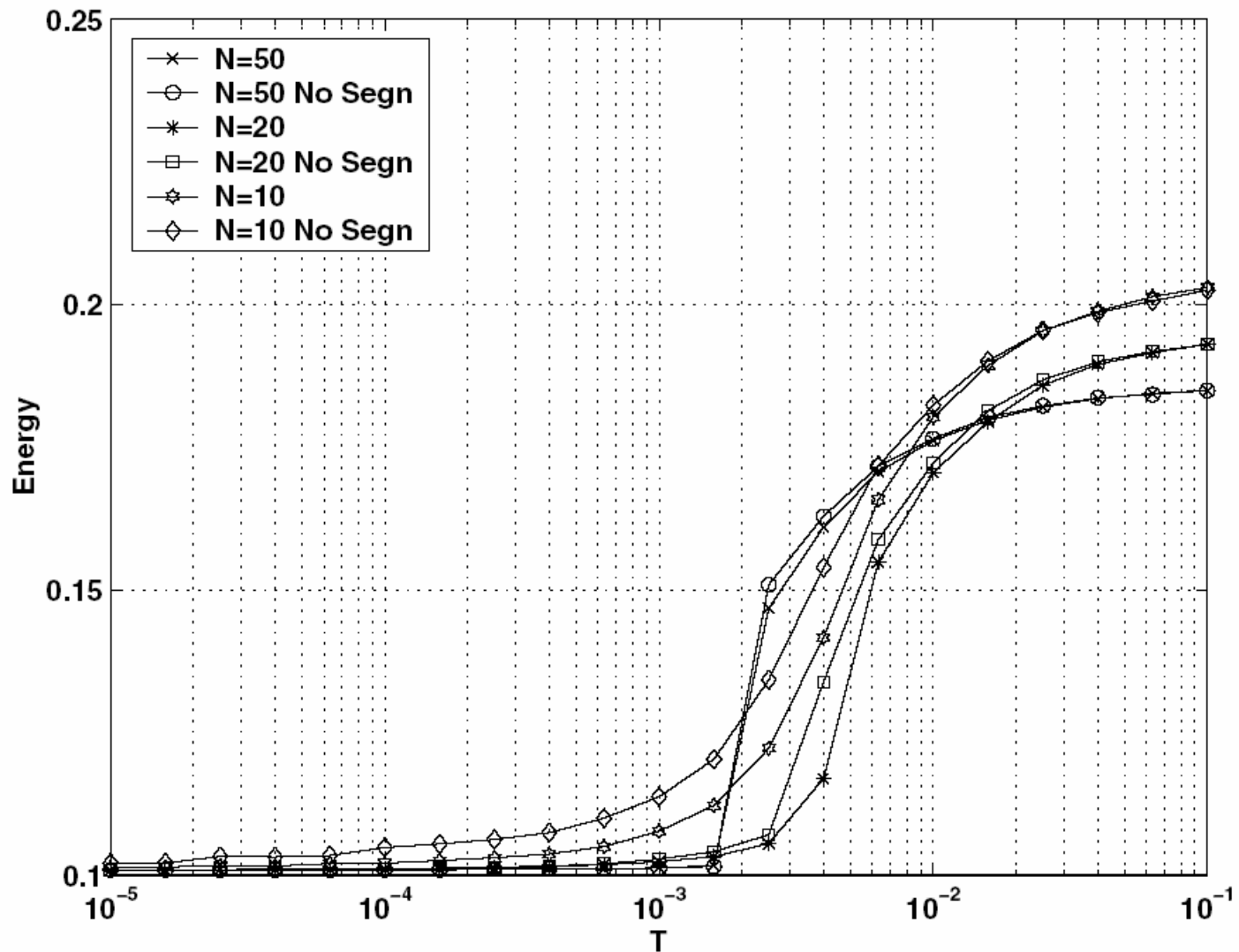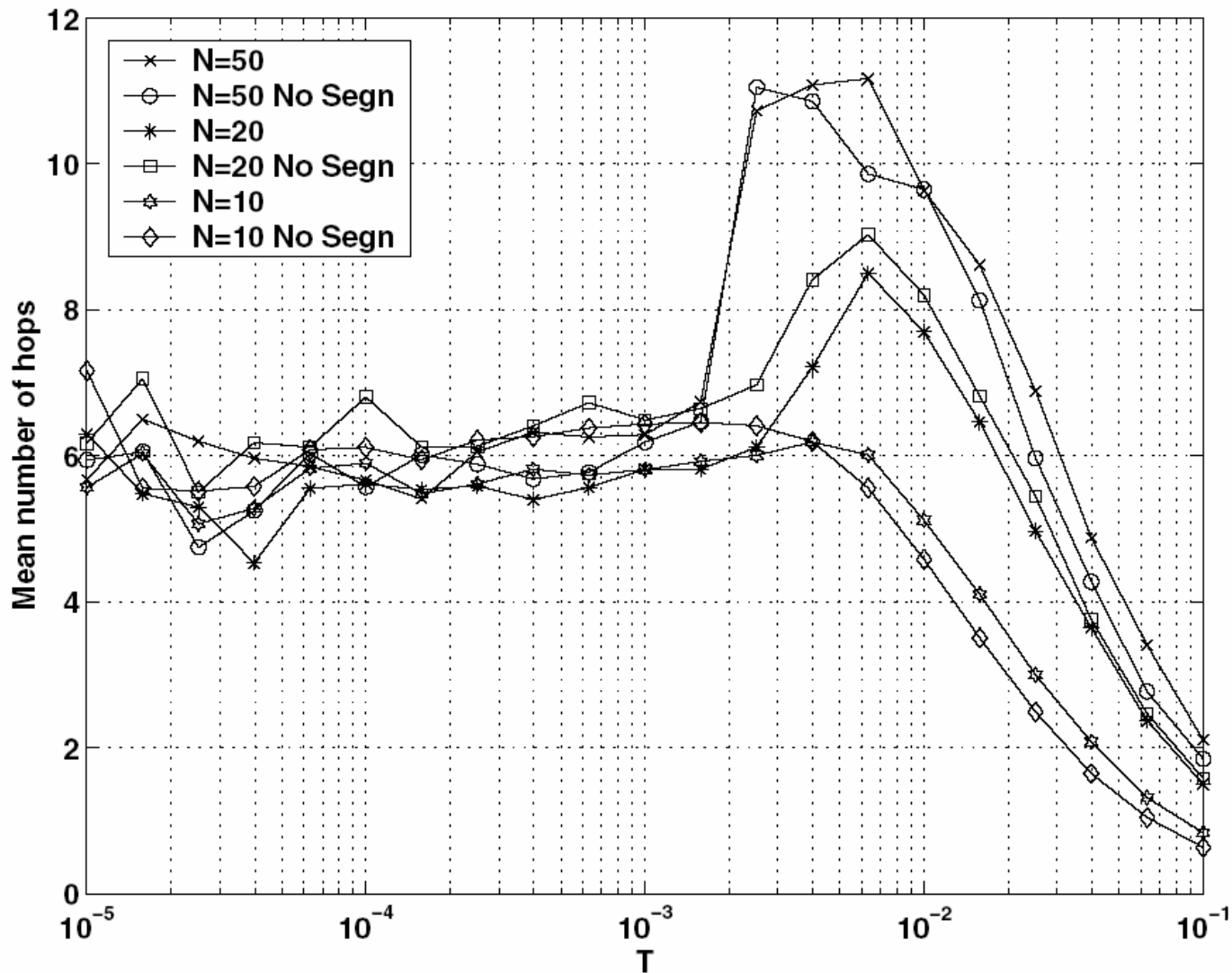- N_{slot}: 9

Simulations

Simulations

Simulations

Simulations

Simulations

Conclusion

♦ an integrate MAC and routing scheme is proposed

♦ each node has knowledge regarding its location on the network and the addressing space is directly linked to the node position.

♦ Using a single radio

♦ And a simple delivery mechanism

Thank you