COST/BENEFIT ANALYSYS OF THE W2LAN PROTOCOL

By

Francesc Burrull
Francisco Miguel Monzo-Sanchez
Josemaria Malgosa Sanahuja
Joan Garcia-Haro

Information and Communication Technologies Department
UPCT-Spain

Outline

2. Brief Summary of W2LAN
   - W2LAN Conversations
   - W2LAN Operation Example
3. Cost/Benefit Analysis
   - Cost: Number of frames per conversation
   - Benefit: MANET with total visibility
4. Analyzed Scenarios
   - Linear Grid
   - Square grid
   - Random grid
5. Summary, Conclusions and Future Work

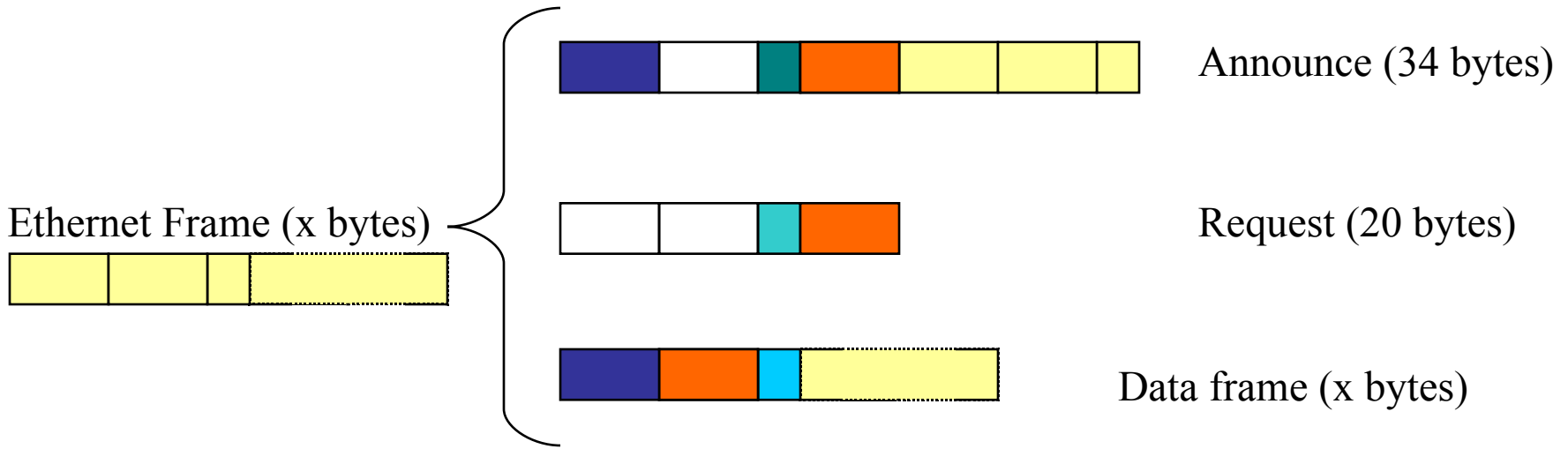**Brief Summary of W2LAN**

W2LAN Conversations (I)
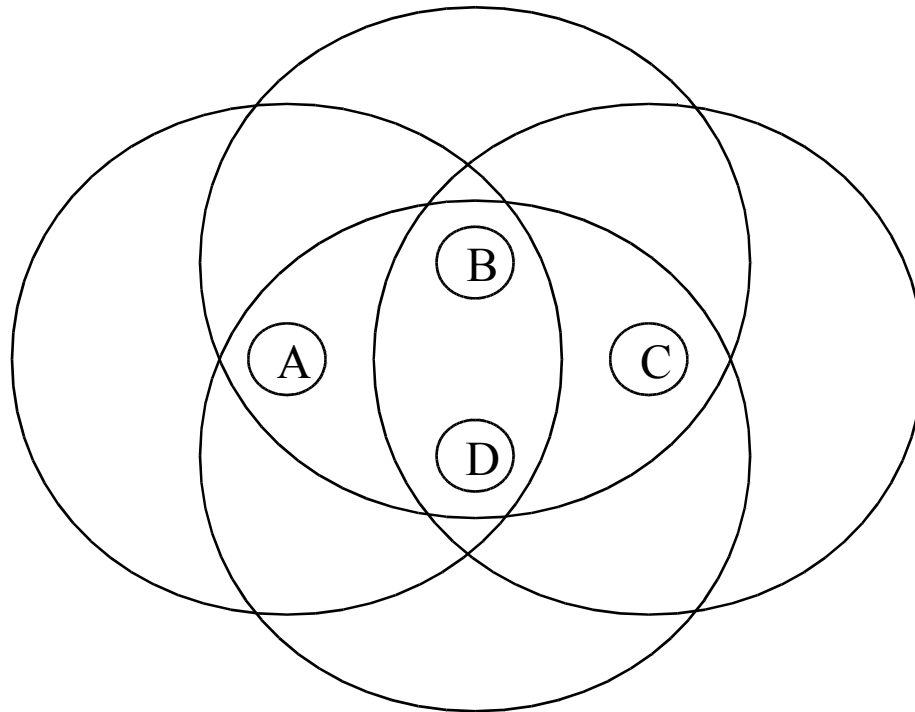
A **Conversation** is the set of frames that share an unique ID (48 bits) among the network

Proposed solution: W2LAN

W2LAN Conversations (II)

Ethernet Frame (x bytes)

Announce (34 bytes)

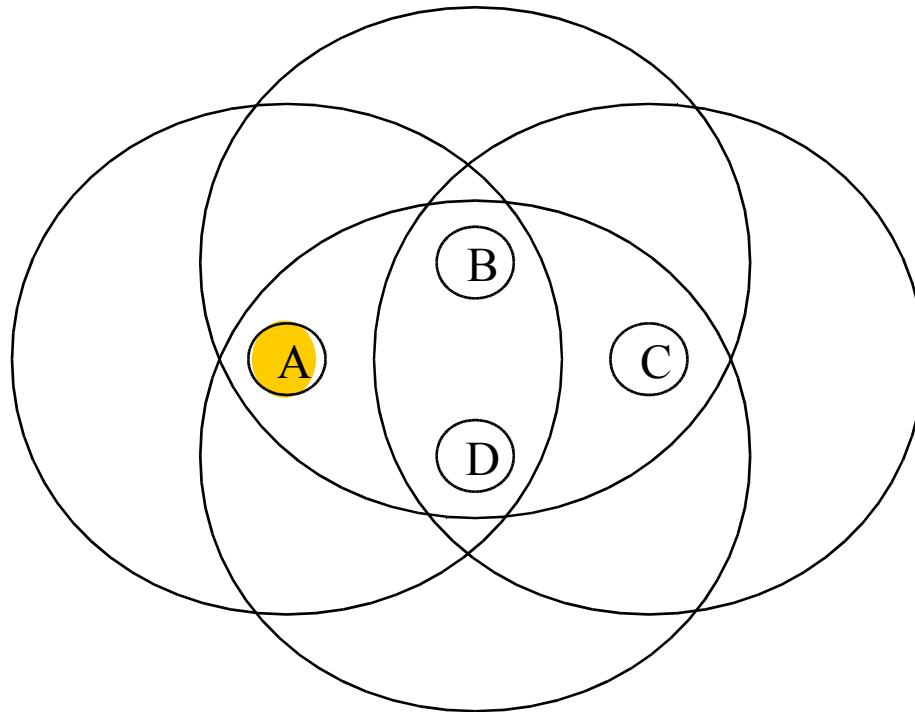Request (20 bytes)

Data frame (x bytes)

Compatible !

Each **Transaction** (conversation step) is divided into
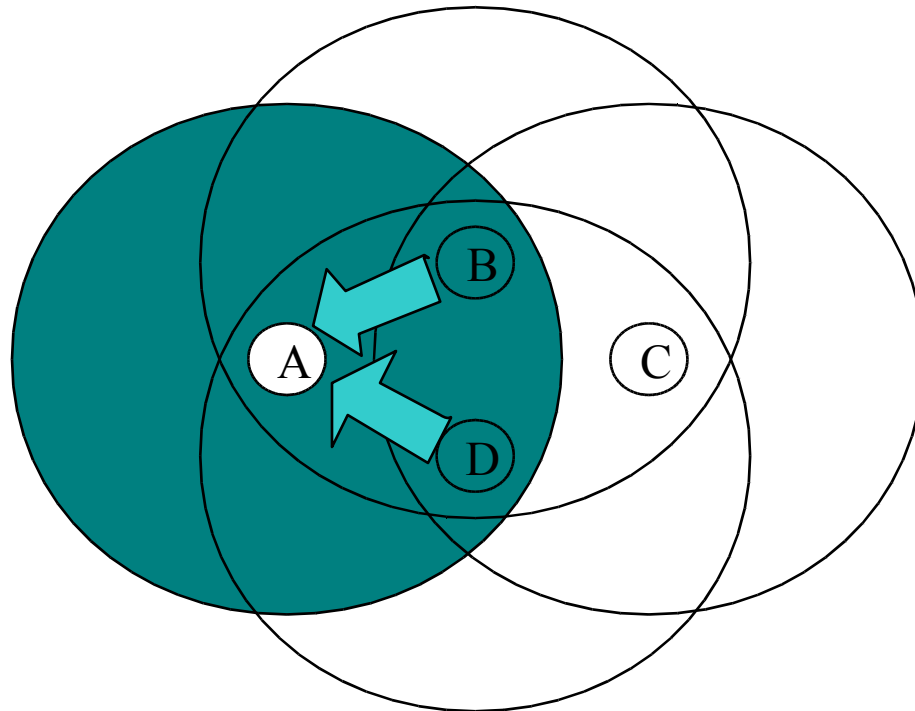Announce, Request, Data

Proposed solution: W2LAN

W2LAN Operation Example (I)

Node A receives data from upper layers to
be transmitted into an Ethernet frame
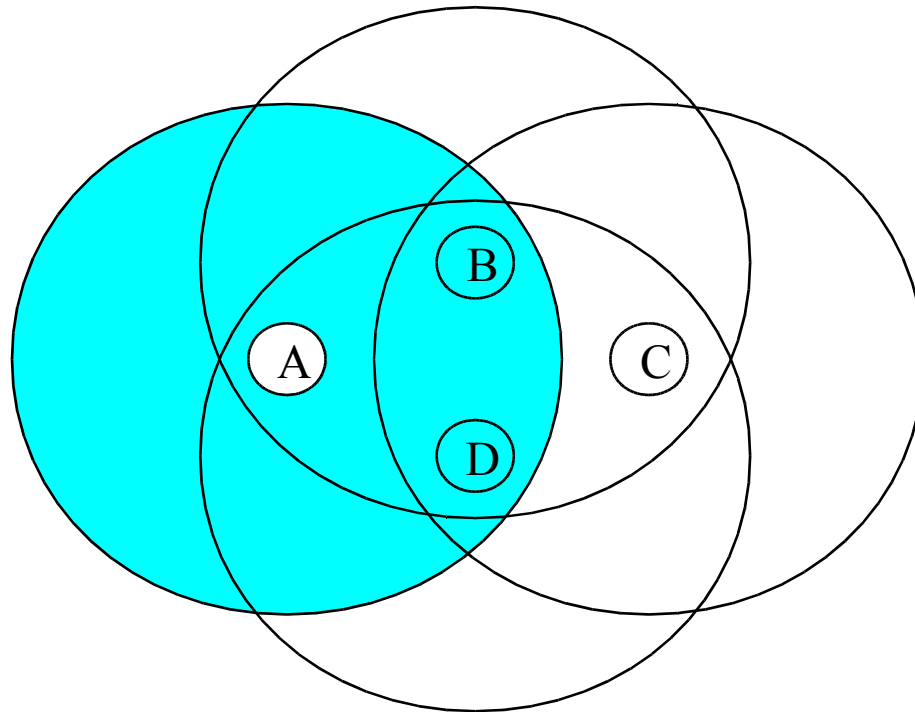
W2LAN Operation Example (II)

Node A announces conversation *convID*.
Nodes B and D hear the announce,
and since they don't have this **conversation**, they request it.
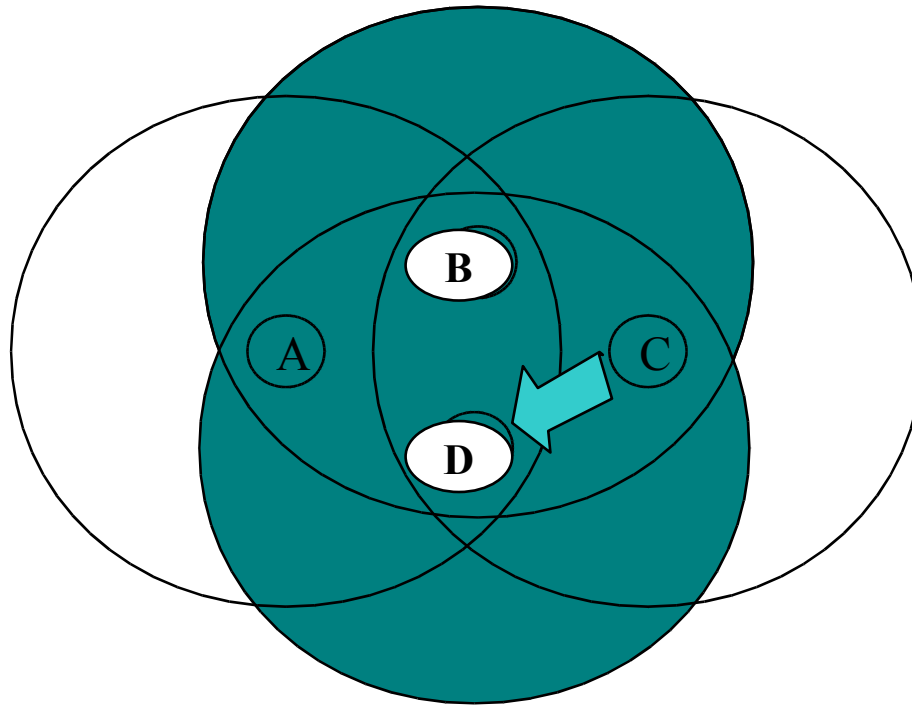
Proposed solution: W2LAN

W2LAN Operation Example (III)

After the request window period expires,
node A finishes the **transaction** by sending the data packet
associated with conversation *convID*

W2LAN Operation Example (IV)

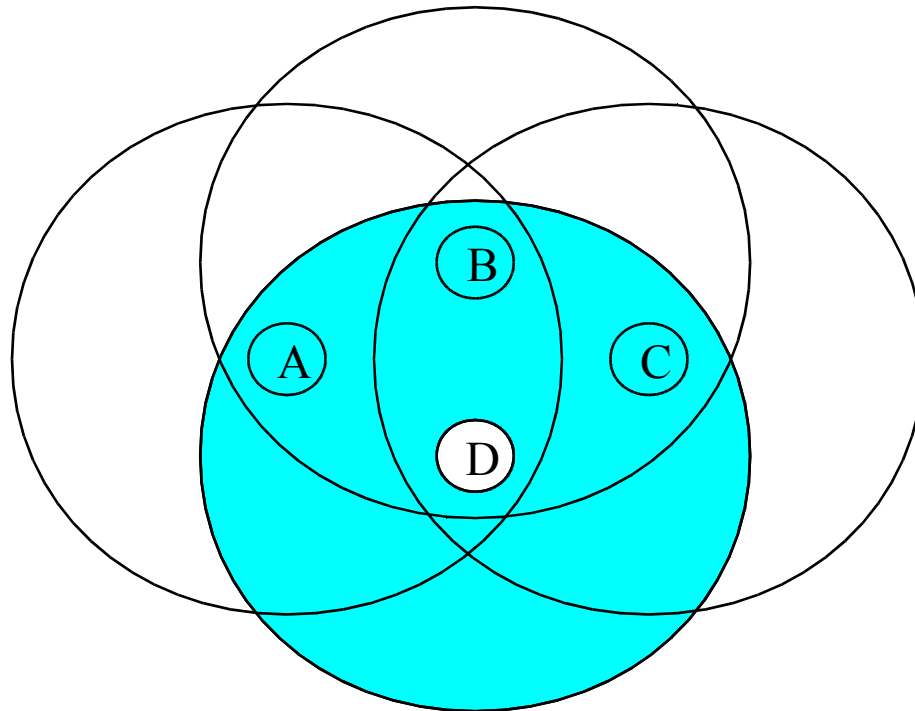Nodes B and D start **transactions** announcing conversation *convID*.
Node C hear both announces,
and since it doesn't have this **conversation**,
C requests it to the first announcer and ignores the second one.
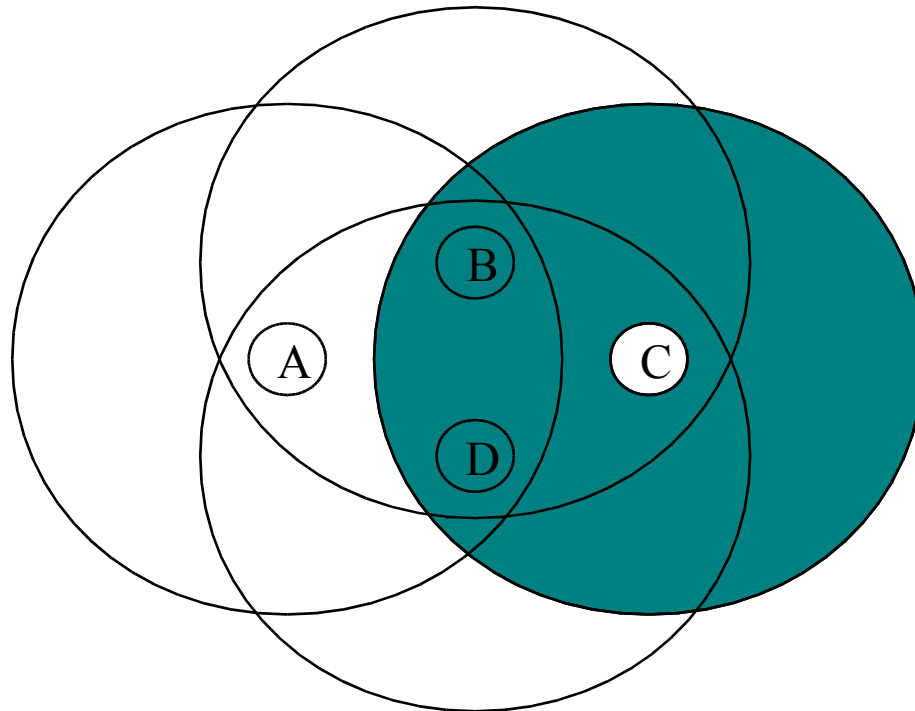
Proposed solution: W2LAN

W2LAN Operation Example (V)

After the request window period expires,
node D sends the data packet associated with conversation *convID*

Proposed solution: W2LAN

W2LAN Operation Example (VI)

Finally Node C announces conversation *convID*.
Nobody requests this conversation, since B and D already have it.

Cost: Number of frames per conversation

- Pure Ethernet environment: Cost = 1 frame

- W2LAN environment: Cost in frames depends on 3 factors:

  - Number of nodes: Increases

  - Coverage radius: Decreases

  - Topology: Uncertainty

- Cost definitions

  - Absolute cost: Includes Announce (34 bytes), Request (20 bytes) and Data frames   4A+3R+2D

  - Analyzed cost: # of Data frames per Conversation   2D

The number of Announce frames and Request frames remain constant given a scenario

The size of Announce frames and Request frames is constant (and small)

Benefit: MANET with total visibility

- Main benefit: MANET with total visibility
- Other benefits/characteristics:
  - Simplicity: Frame forwarding without:
    - Routing information
    - Position knowledge
  - Robustness: Achieved through multiple copies
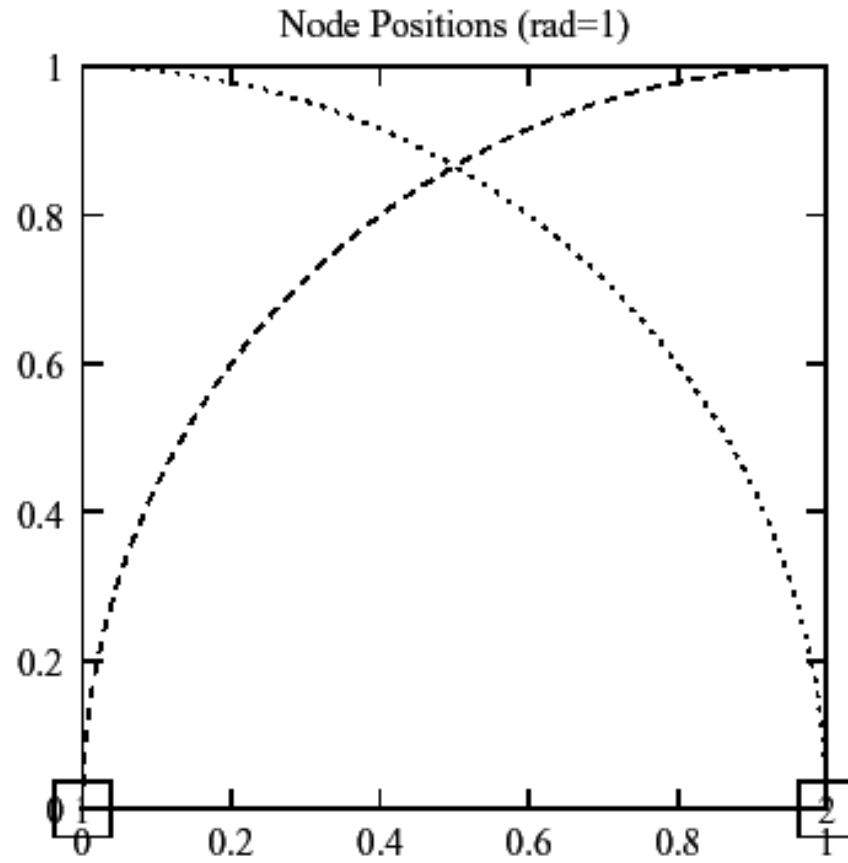 - Always "shortest" path

Analyzed Scenarios

- Analyzed Scenarios (from simple to complex)
  1. Linear Grid (i.e. perimeters)
  2. Square grid (i.e. coverage of an area)
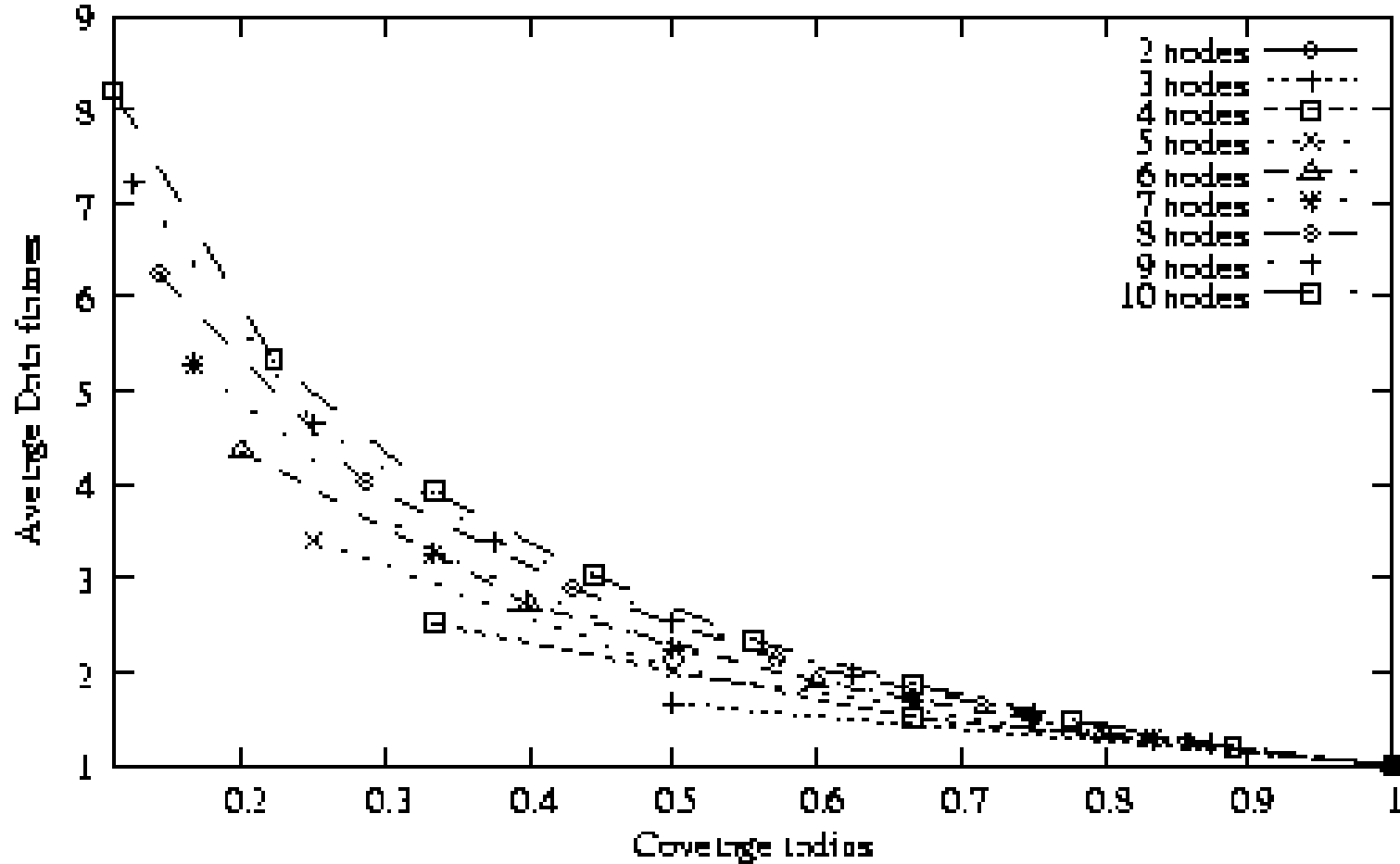 3. Random grid (i.e. mobility)

Linear grid (I)

Analysed Scenarios

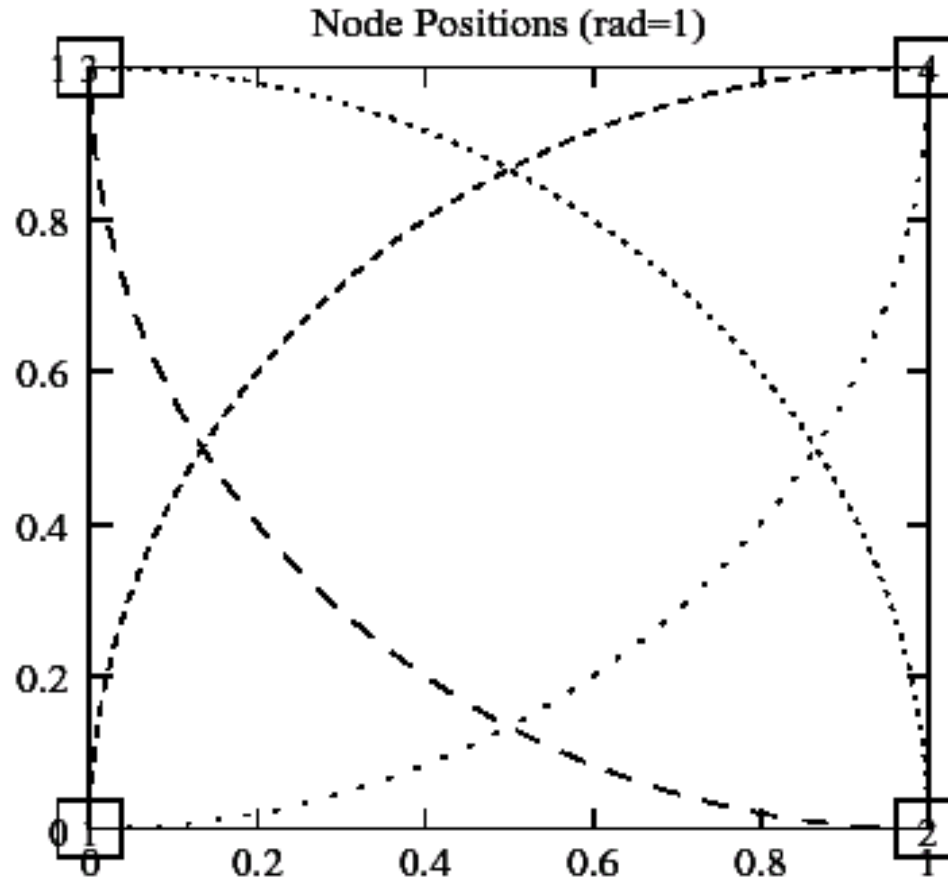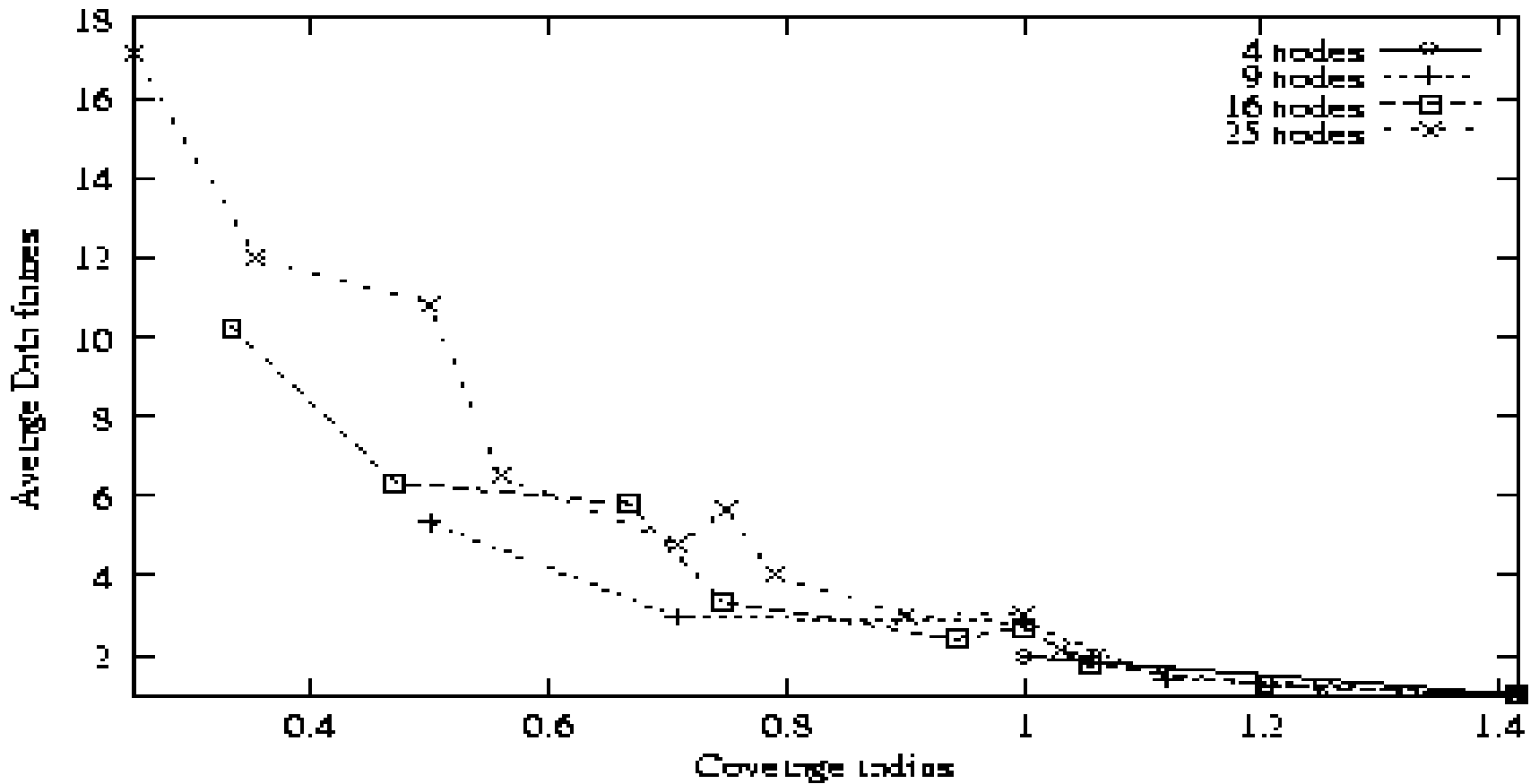# Linear grid (II)

Square grid (I)

Node Positions (rad=1)

Square grid (II)

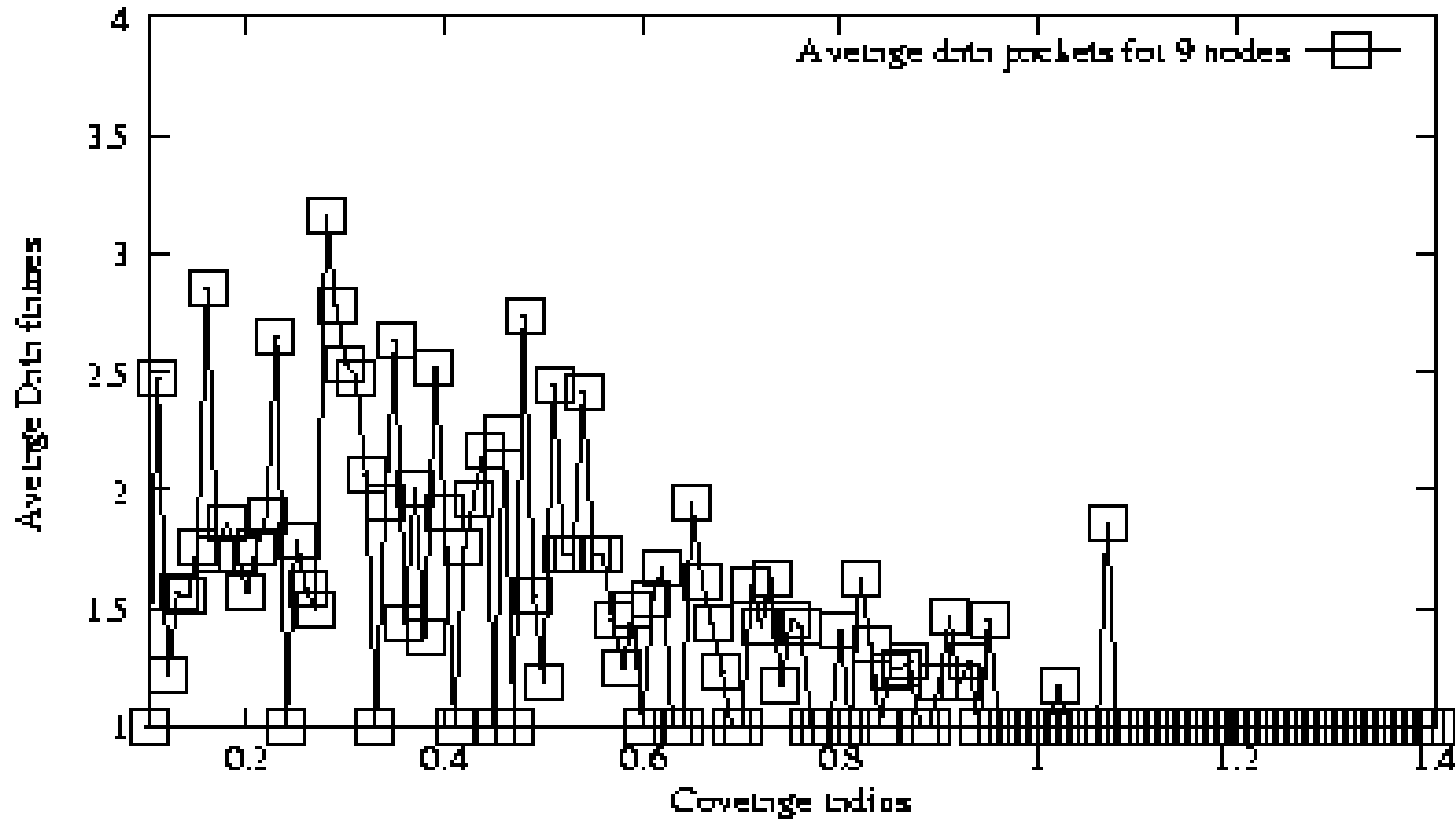# Random grid (I)

Node Positions (rad=0.5)

Analysed Scenarios

Random grid (II)
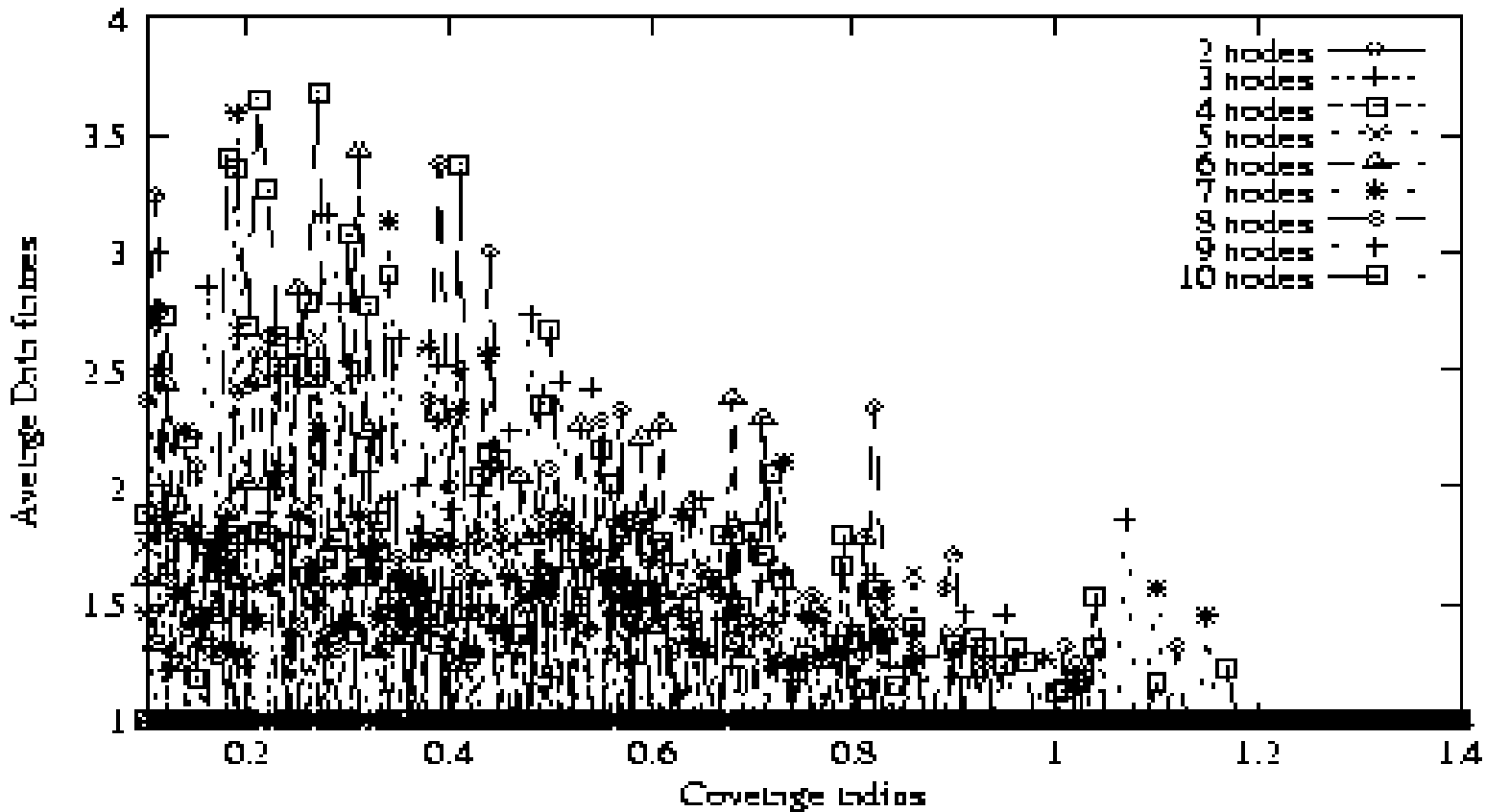
Analysed Scenarios

Random grid (III)

Summary, Conclusions and Future Work

- To achieve total visibility among nodes a price has to be paid. In a W2LAN environment it means frame repetition
- W2LAN behavior is acceptable in scenarios with high connectivity (exploits redundancy).

- A Multicast scenario is being studied (where major MANET protocols are challenged)
- A linux kernel module is almost ready

THANK YOU

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