W2LAN:
Protocol that transforms a 802.11 Mobile Ad-Hoc Network (MANET) into an Ethernet LAN

By

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Outline

1. Motivation
   1. Reuse of existing and well-established LAN protocols
   2. Partial visibility of Ad-hoc networks
2. Proposed solution: W2LAN
   1. OSI Placement: layer 2 protocol
   2. W2LAN Conversations
   3. W2LAN Operation Example
   4. Internal Lists
3. Summary, Conclusions and Future Work

LAN Protocol reuse

1. IPS (Instant Photo Souvenir) uses MCDP-LAN (existing protocol), which exploits the broadcast nature of an Ethernet LAN

Motivation

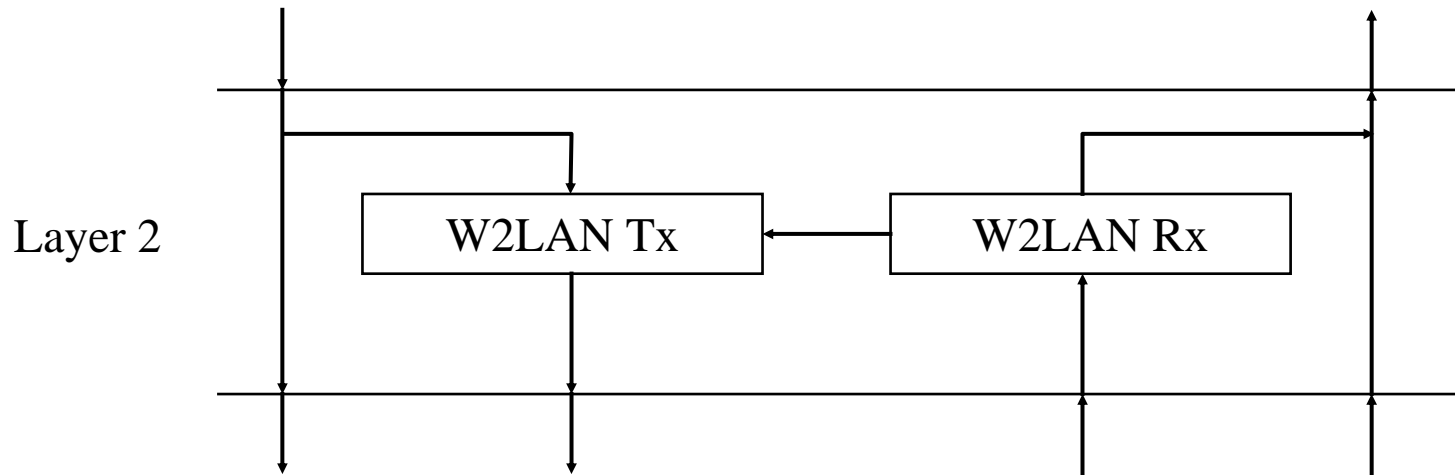# Partial visibility of Ad-Hoc networks

1. Newer IPS versions can use mobile POS (Point of sales). Sometimes fast deployment is required in "capricious" areas, where coverage can be challenging.

OSI Placement: layer 2 protocol

Layer 2

| W2LAN Tx | ← | W2LAN Rx |

Proposed solution: W2LAN

W2LAN Conversations (I)
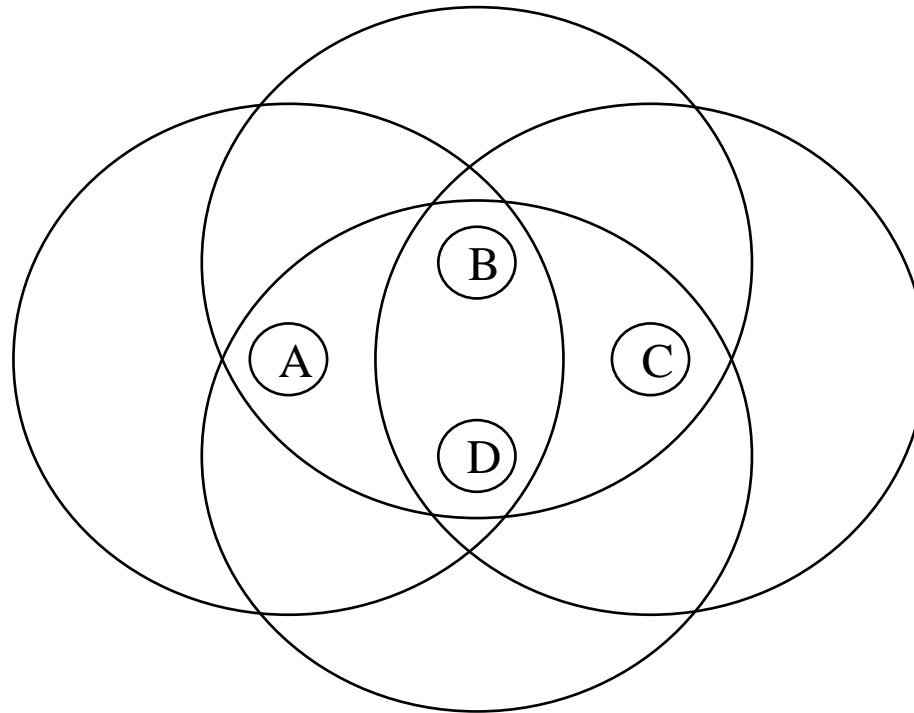
A conversation has an unique ID (48 bits) among the network

Proposed solution: W2LAN

W2LAN Conversations (II)

Ethernet Frame (x bytes)

Announce (34 bytes)

Request (20 bytes)

Data frame (x bytes)

Compatible !
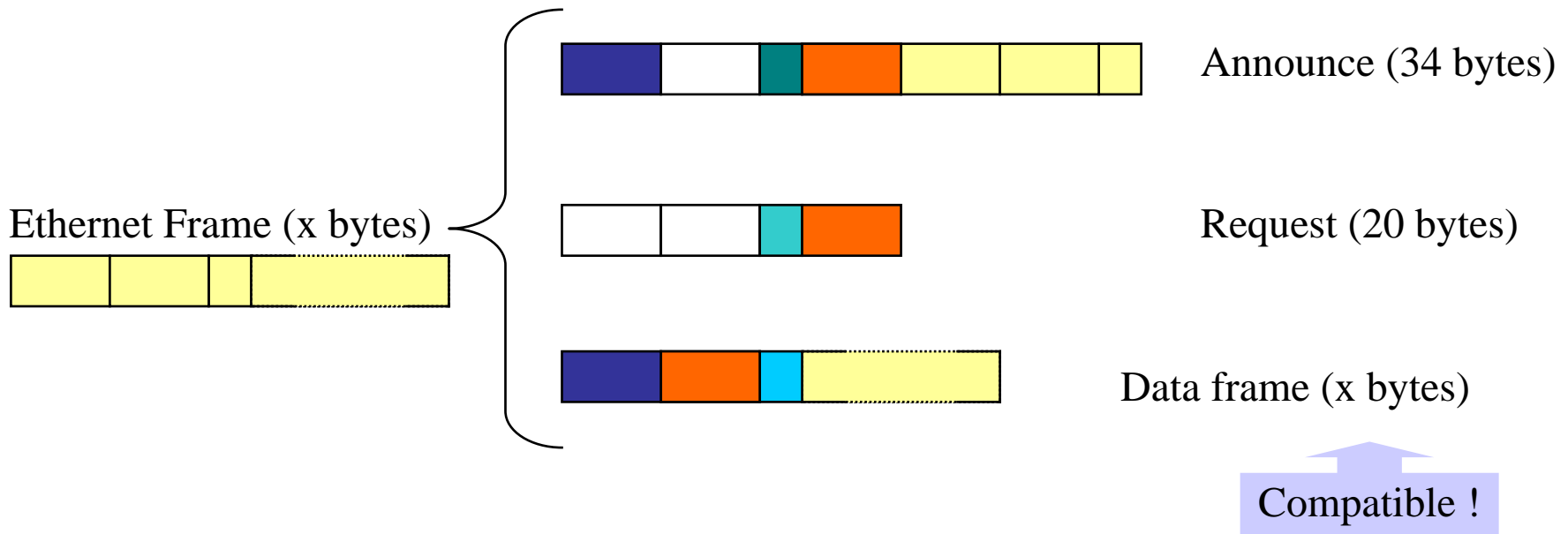
Each conversation step is divided into Announce, Request, Data

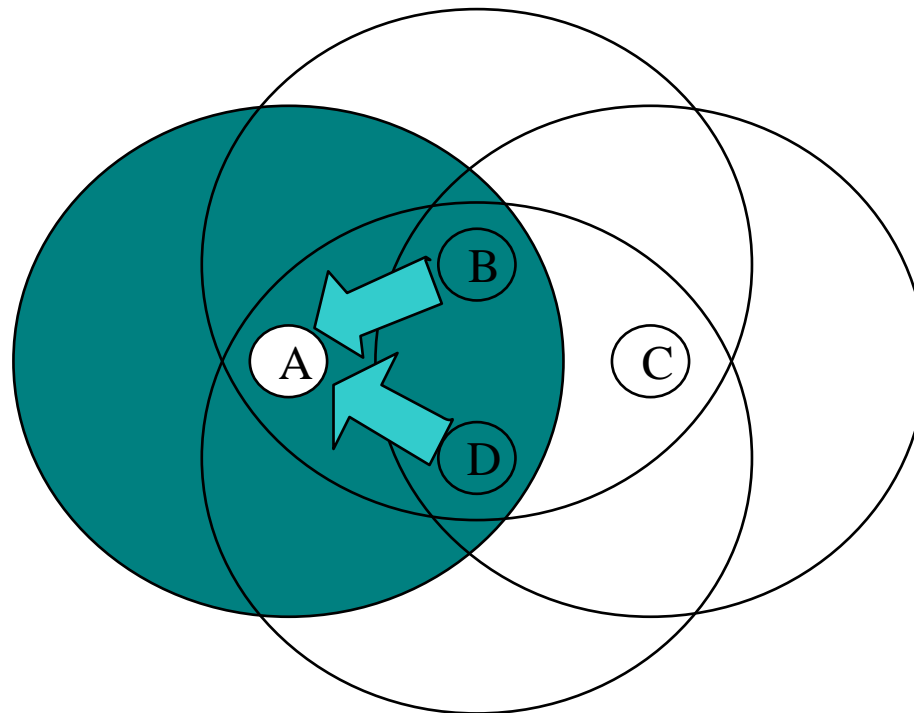**Proposed solution: W2LAN**

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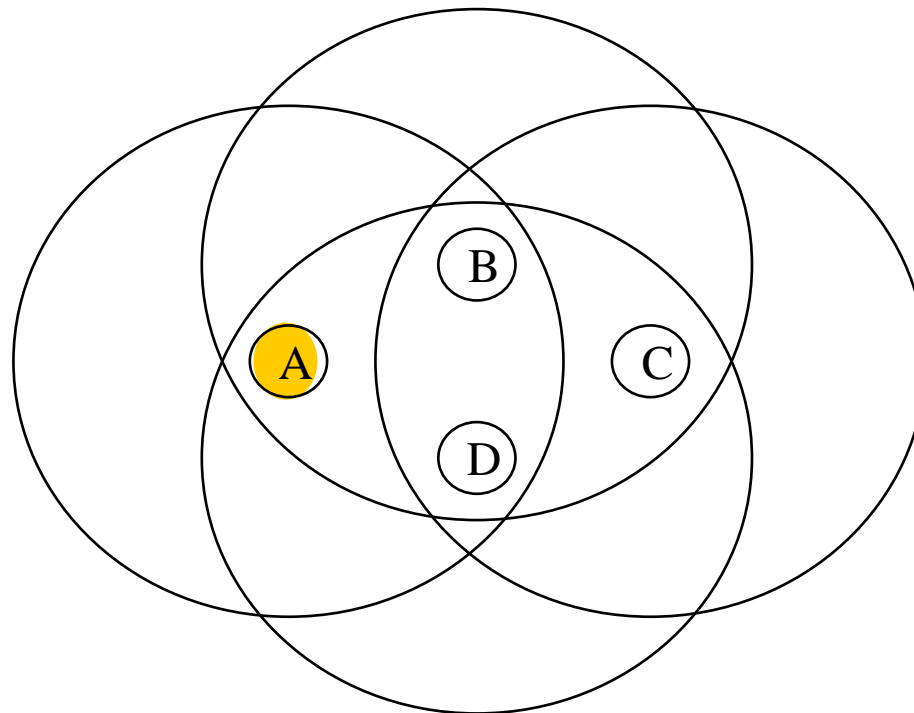
Node A receives data from upper layers to
be transmitted into an Ethernet frame

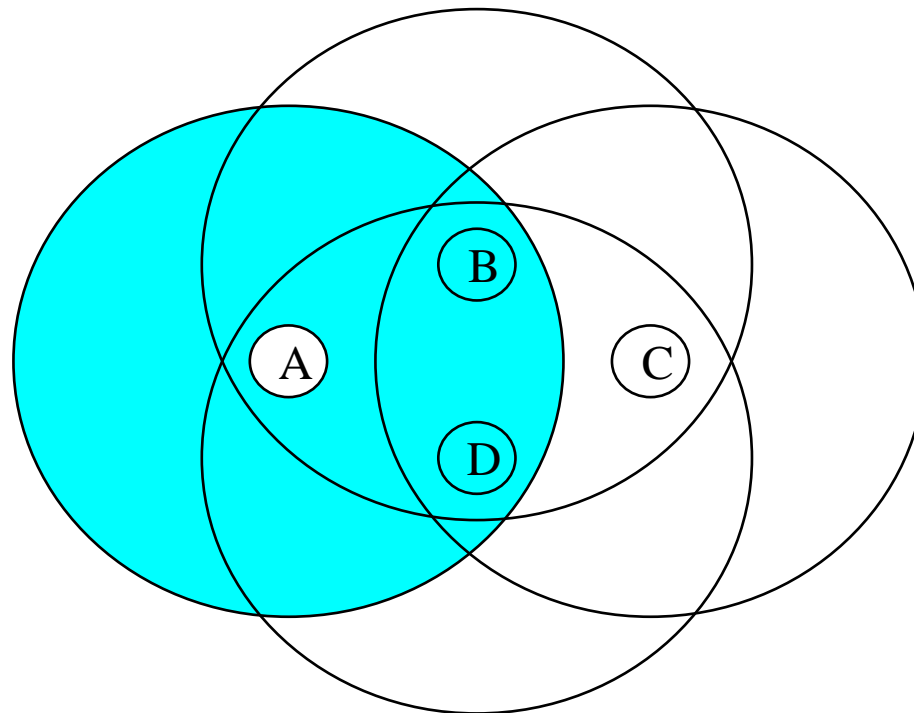# W2LAN Operation Example (II)

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 sends the data packet associated with conversation *convID*

W2LAN Operation Example (IV)

Nodes B and D announce conversation *convID*.
Node C hear both announces,
and since it doesn't have this conversation,
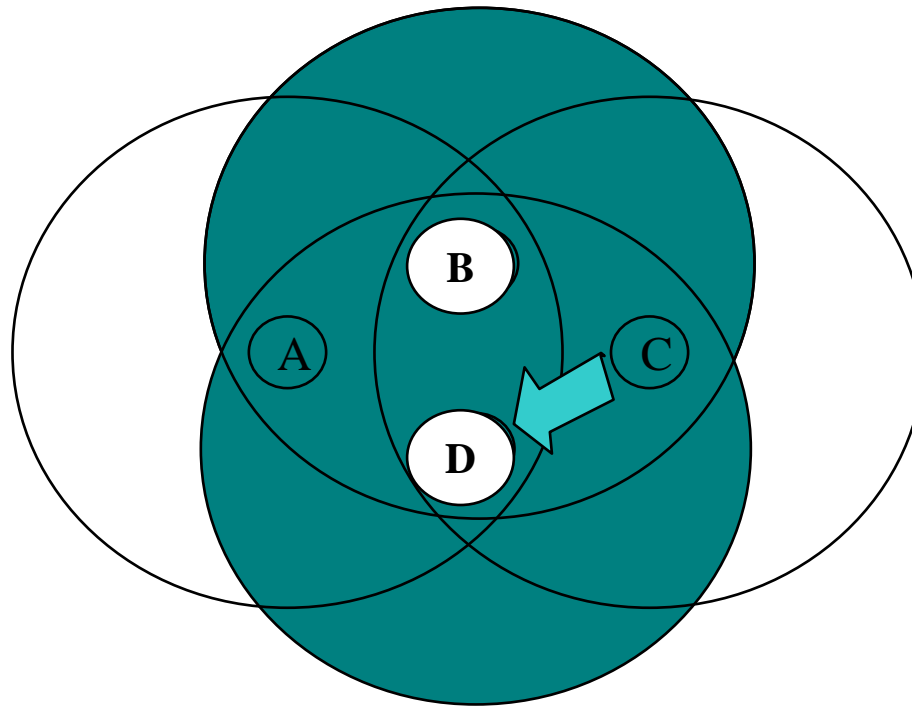C requests it to the first announcer and ignores the second one.

W2LAN Operation Example (V)
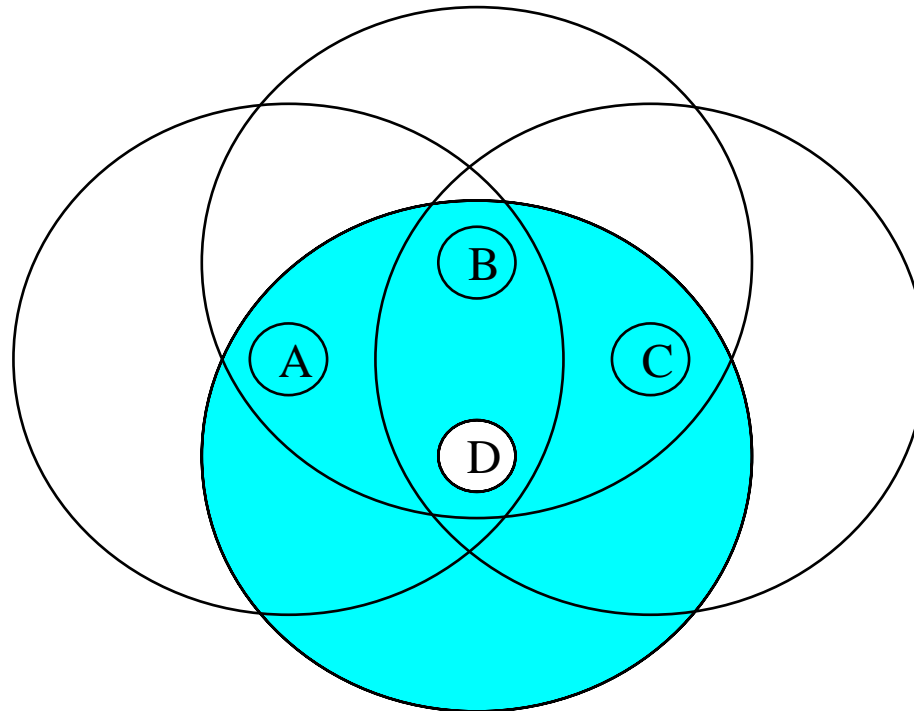
After the request window period expires,
node D sends the data packet associated with conversation *convID*

W2LAN Operation Example (VI)

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

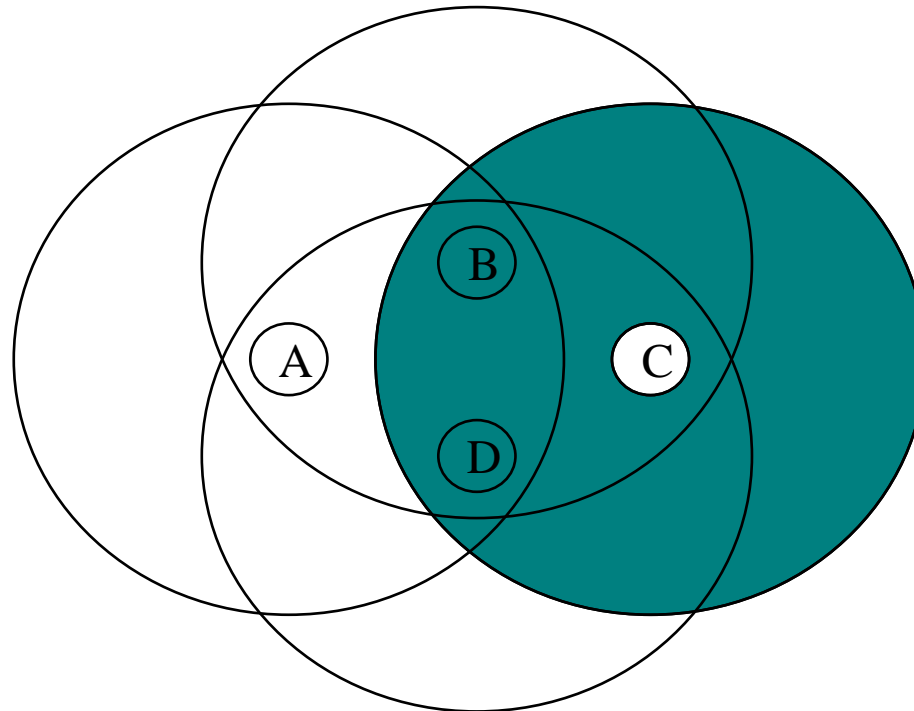**Proposed solution: W2LAN**

Internal lists usage

Concurrency of communications: Need for dynamic lists

Previous to W2LAN Transmission:

- Announce transmitted
  - Add element to Pending list
    (convID, Ethernet data field)
  - Add element to Timers list -FIFO-
    (convID, expiration time)
  - Add element to Counter list -FIFO-
    (convID, number of requests)
- Request transmitted
  - Add elem. to Conversations list -Circular FIFO-
    (convID, pending, Ethernet header)
- Data transmitted
  - Remove element from Pending list
  - Remove element from Timers list
  - Remove element from Counter list

Proposed solution: W2LAN

Internal lists usage

Concurrency of communications: Need for dynamic lists

When occurs a
W2LAN Reception:

- Announce received
  - If not in Conversations list, add
    element to Conversations list as pending
- Request received
  - Increment associated element to Counter list
- Data received
  - If conversation in Conversations list and
    pending, reconstruct frame and mark it as not
    pending

Summary, Conclusions and Future Work

1. W2LAN transforms a 802.11 MANET into a LAN
2. Conclusions
    1. Transparent to layer 3 protocols
    2. Simple protocol, based on broadcast medium
    3. New concept of W2LAN conversation
    4. No routing information. No location information
3. Future Work being performed: Cost/benefit analysis of the protocol in different test beds. Comparison with AODV (Ad-hoc on demand distance vector) and DSR (Dynamic Source Routing) in a multicast environment.

THANK YOU

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