SNS COLLEGE OF TECHNOLOGY

Coimbatore-35

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DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

19ECE402- WIRELESS ADHOC AND SENSOR NETWORKS

IV ECE / VII SEMESTER

UNIT 4 WIRELESS SENSOR NETWORKS

Topic 3- Data Dissemination

3. Data Dissemination

- Data dissemination is the process by which queries or data are routed in the sensor network. The data collected by sensor nodes has to be communicated to the node which interested in the data.
- The node that generates data is call source and the information to be reported is called an event. A node which interested in an event is called sink.
- Data dissemination consist of a two-step process : interest propagation and data propagation.
  - Interest propagation : for every event that a sink is interested in, it broadcasts its interest to is neighbor, and across the network.
  - Data dissemination : When an event is detected, it reported to the interested nodes (sink).

3.1Flooding

- Each node which receives a packet (queries/data) broadcasts it if the maximum hop-count of the packet is not reached and the node itself is not the destination of the packet.
- Disadvantages :
  - Implosion : this is the situation when duplicate messages are send to the same node. This occurs when a node receives copies of the same messages from many of its neighbors.
  - Overlap : the same event may be sensed by more than one node due to overlapping regions of coverage. This results in their neighbors receiving duplicate reports of the same event.
  - Resource blindness : the flooding protocol does not consider the available energy at the nodes and results in many redundant transmissions. Hence, it reduces the network lifetime.

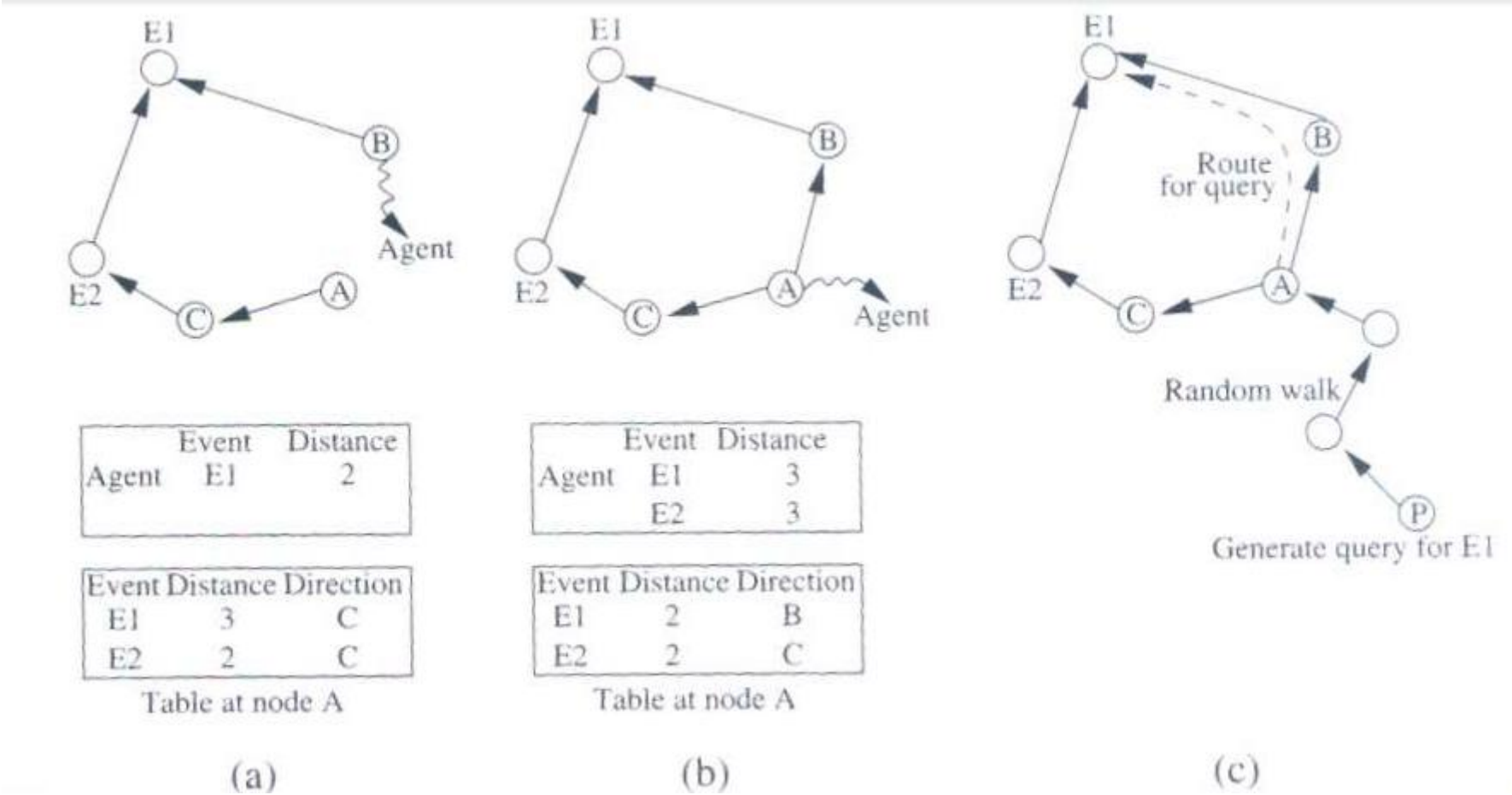
Gossiping

- Modified version of blooding
- The nodes do not broadcast a packet, but send it to a randomly selected neighbor.
- Avoid the problem of implosion
- It takes a long time for message to propagate throughout the network.
- It does not guarantee that all nodes of network will receive the message.

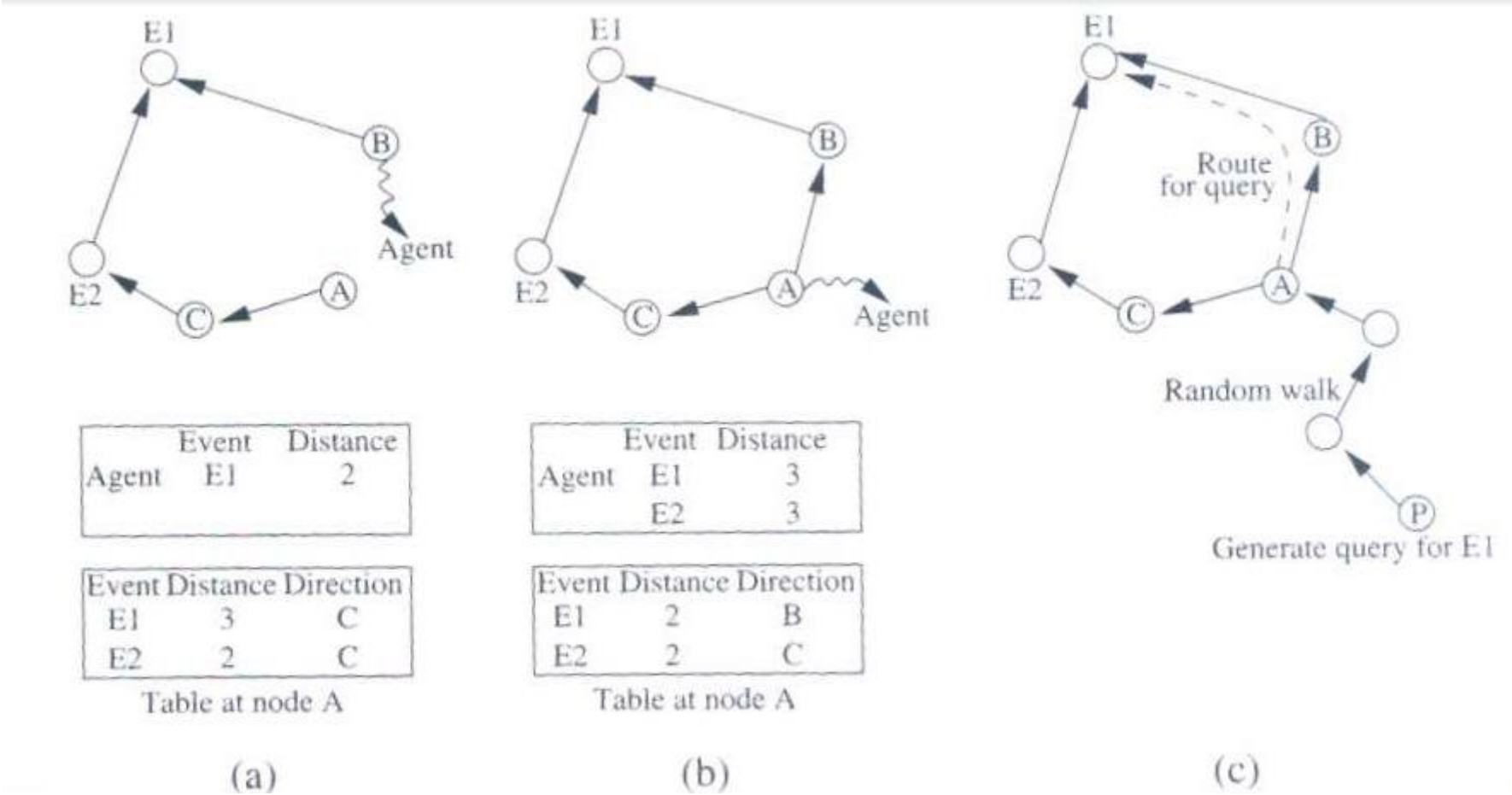
Rumor Routing

- Agent-based path creation algorithm
- Agent is a long-lived packet created at random by nodes, and it will die after visit k hops.
- It circulated in the network to establish shortest paths to events that they encounter.
- When an agent finds a node whose path to an event is longer than its own, it updates the node's routing table.

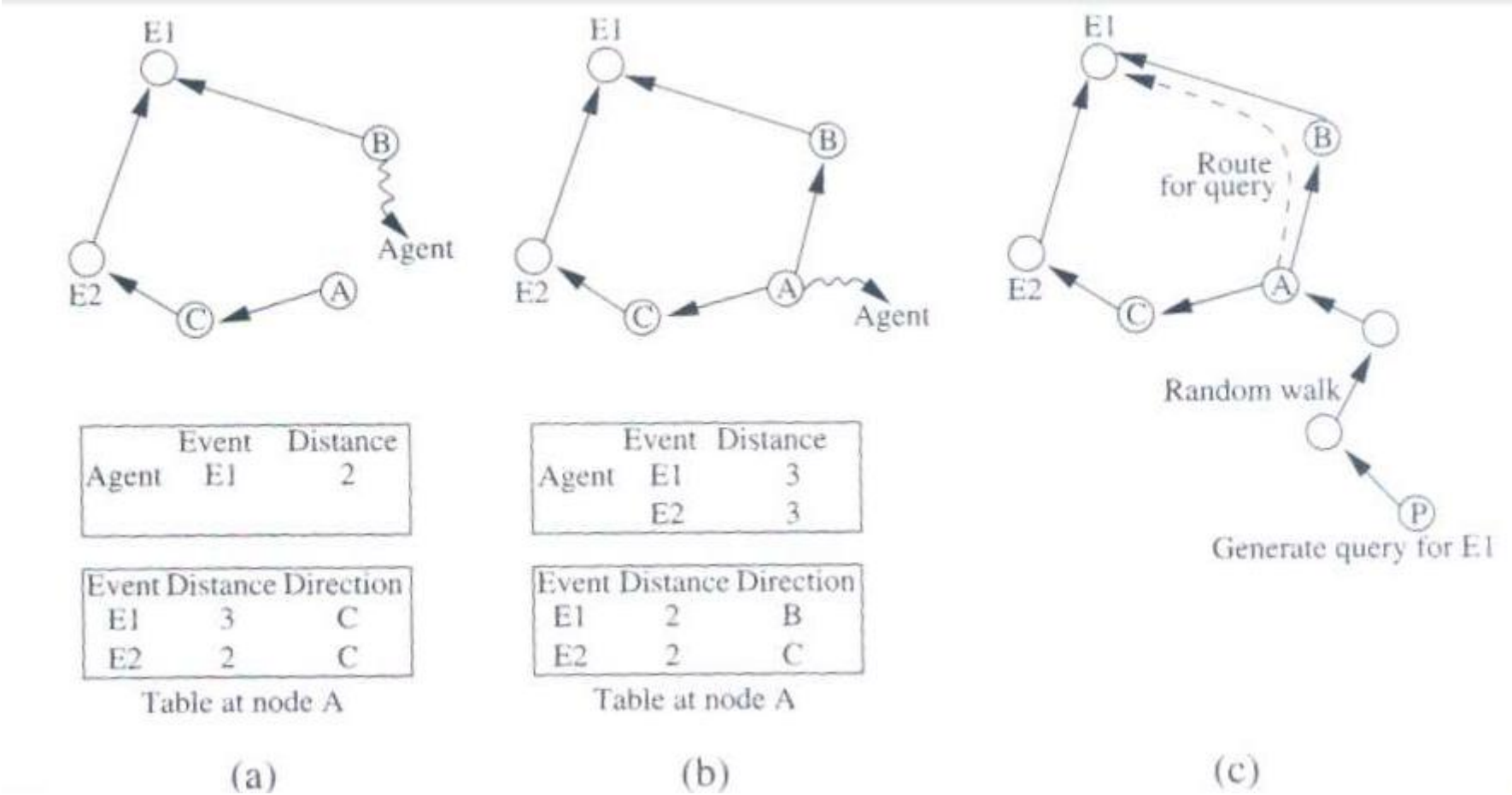
Rumor routing



Rumor routing



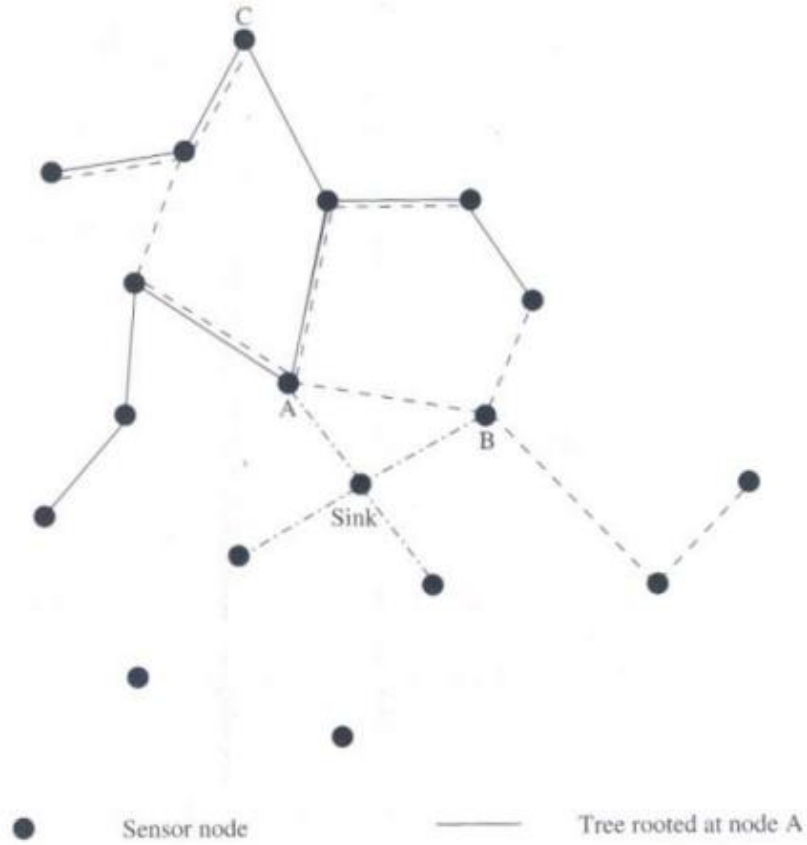
Rumor routing



Sequential Assignment Routing (SAR)

- The sequential assignment routing (SAR) algorithm creates multiple trees, where the root of each tree is a one-hop neighbor of the sink.
- To avoid nodes with low throughput or high delay.
- Each sensor node records two parameters about each path though it : available energy resources on the path and an additive QoS metric such as delay.
  - Higher priority packets take lower delay paths, and lower priority packets have to use the paths of greater delay, so that the priority x delay QoS metric is maintained.
- SAR minimizes the average weighted QoS metric over the lifetime of the network.

Rumor routing



Directed Diffusion

- The directed diffusion protocol is useful in scenarios where the sensor nodes themselves generate requests/queries for data sensed by other nodes.
- Each sensor node names its data with one or more attributes.
- Each sensor node express their interest depending on these attributes.
- Each path is associated with a interest gradient, while positive gradient make the data flow along the path, negative gradient inhibit the distribution data along a particular path.
  - Example : two path formed with gradient 0.4 and 0.8, the source may twice as much data along the higher one
  - Suppose the sink wants more frequent update from the sensor which have detected an event => send a higher data-rate requirement for increasing the gradient of that path.

Directed Diffusion

- Query
  - Type = vehicle /* detect vehicle location
    interval = 1 s /* report every 1 second
    rect = [0,0,600,800] /* query addressed to sensors within the rectangle
    timestamp = 02:30:00 /* when the interest was originated
    expiresAt = 03:00:00 /* till when the sink retain interest in this data

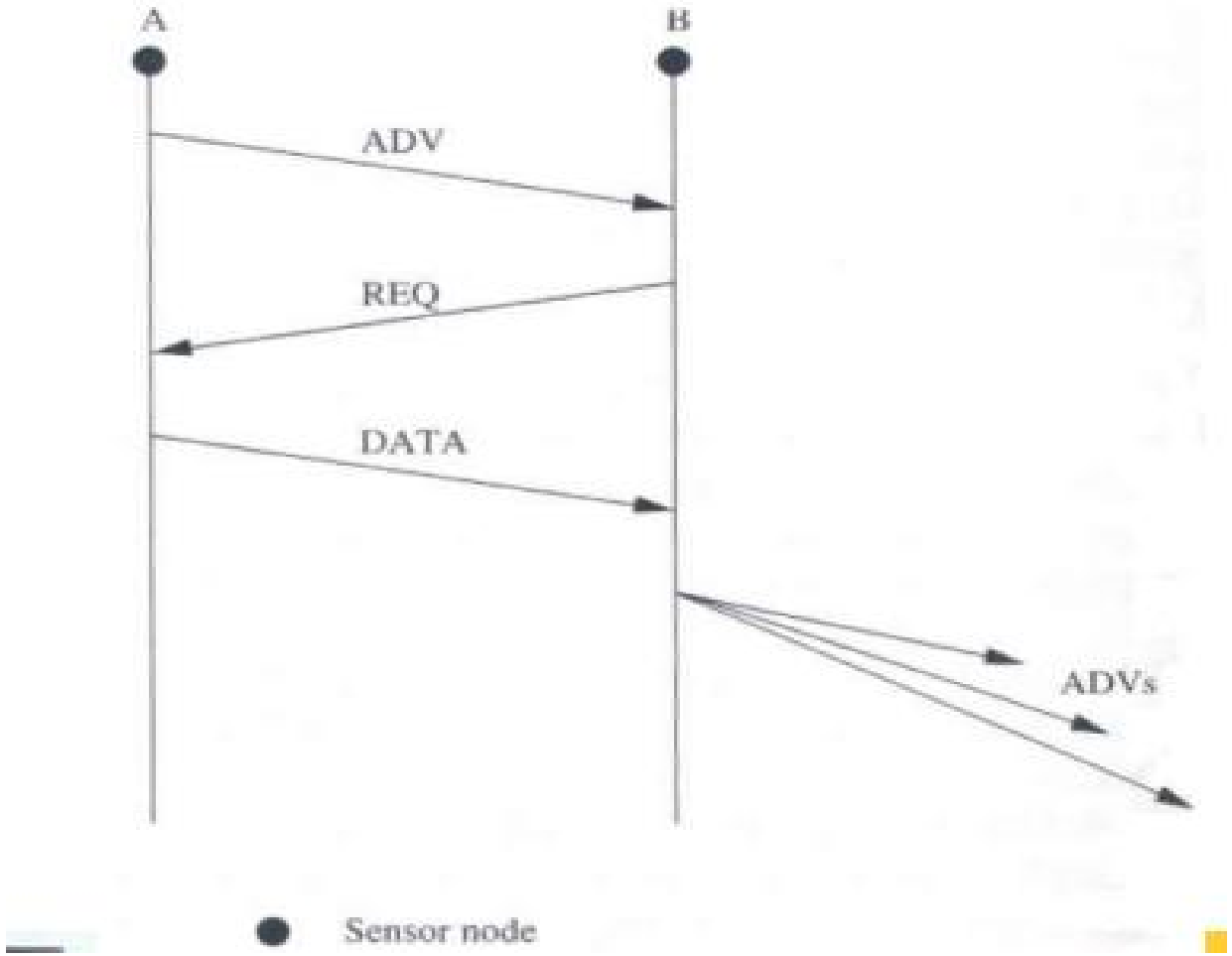
- Report
  - Type = vehicle /* type of intrusion seen
    instance = car /* particular instance of the type
    location = [200,250] /* location of node
    confidence = 0.80 /* confidence of match
    timestamp = 02:45:20 /* time of detection

Sensor Protocols for Information via Negotiation

- SPIN use negotiation and resource adaptation to address the disadvantage of flooding.
- Reduce overlap and implosion, and prolong network lifetime.
- Use meta-data instead of raw data.
- SPIN has three types of messages: ADV, REQ, and DATA.

- SPIN-2 using an energy threshold to reduce participation. A node may join in the ADV-REQ-DATA handshake only if it has sufficient resource above a threshold.

Directed Diffusion



Directed Diffusion

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