



# **SNS COLLEGE OF TECHNOLOGY**

**Coimbatore-35**

**An Autonomous Institution**

Accredited by NBA – AICTE and Accredited by NAAC – UGC with 'A+'  
Grade

Approved by AICTE, New Delhi & Affiliated to Anna University,  
Chennai



## **DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING**

### **19ECE402- WIRELESS ADHOC AND SENSOR NETWORKS**

IV ECE / VII SEMESTER

#### **UNIT 4 WIRELESS SENSOR NETWORKS**

Topic 4- Data gathering



# Data Gathering



- The objective of the data gathering problem is to transmit the sensed data from each sensor node to a BS.
- The goal of algorithm which implement data gathering is
  - maximize the lifetime of network
  - Minimum energy should be consumed
  - The transmission occur with minimum delay
- The energy x delay metric is used to compare algorithm



# Data Transmissin



- All sensor nodes transmit their data directly to the BS.
- It cost expensive when the sensor nodes are very far from the BS.
- Nodes must take turns while transmitting to the BS to avoid collision, so the media access delay is also large. Hence, this scheme performs poorly with respect to the energy x delay metric.





# Power-Efficient Gathering for Sensor Information Systems



- PEGASIS based on the assumption that all sensor nodes know the location of every other node.
- Any node has the required transmission range to reach the BS in one hop, when it is selected as a leader.
- The goal of PEGASIS are as following
  - Minimize the distance over which each node transmit
  - Minimize the broadcasting overhead
  - Minimize the number of messages that need to be sent to the BS
  - Distribute the energy consumption equally across all nodes
- To construct a chain of sensor nodes, starting from the node farthest from the BS. At each step, the nearest neighbor which has not been visited is added to the chain.
- It is reconstructed when nodes die out.



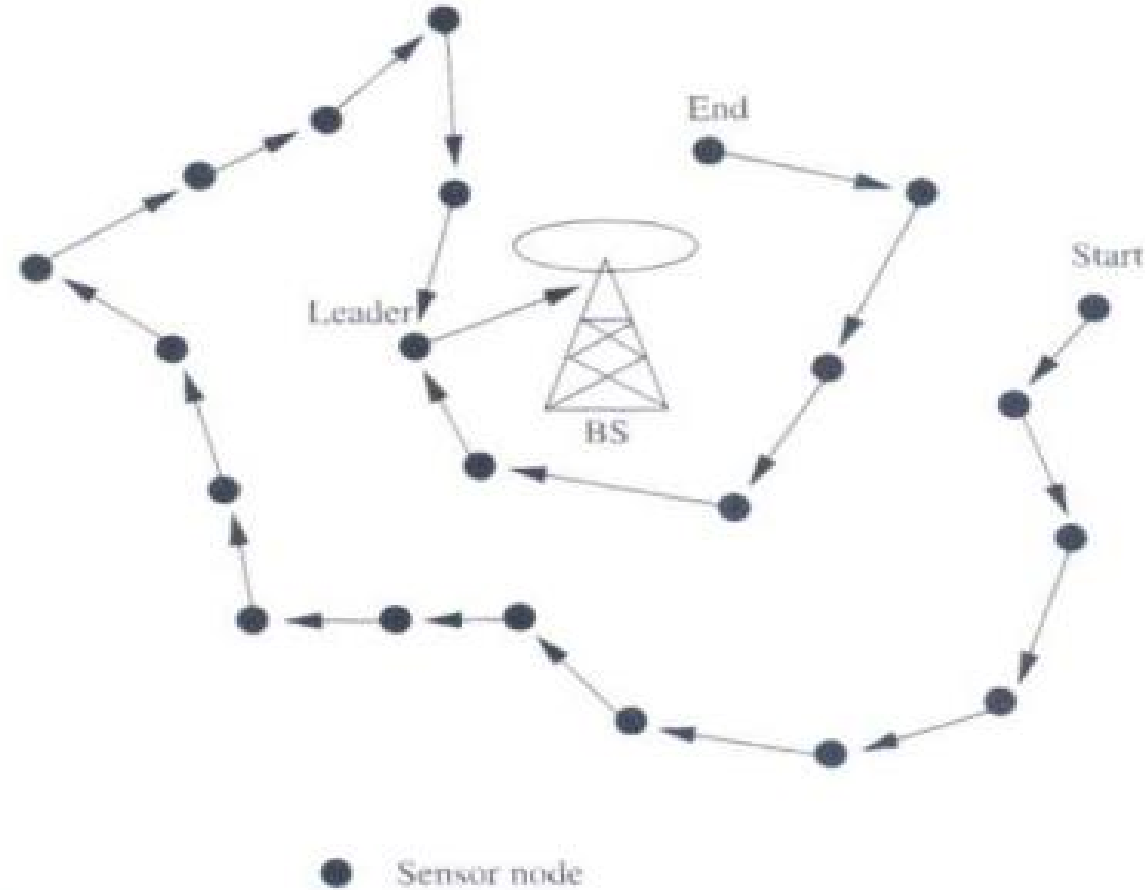
# Power-Efficient Gathering for Sensor Information Systems



- At every node, data fusion or aggregation is carried out.
- A node which is designated as the leader finally transmits one message to the BS.
- Leadership is transferred in sequential order.
- The delay involved in messages reaching the BS is  $O(N)$



# Figure Data gathering with PEGASIS

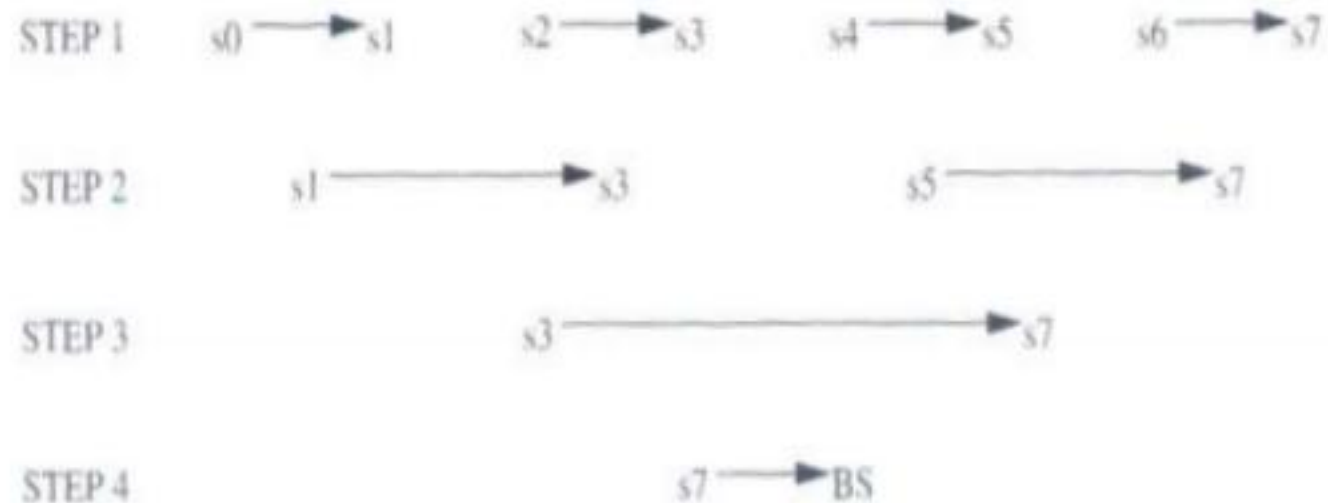




# Binary Scheme



- This is a chain-based scheme like PEGASIS, which classifies nodes into different levels.
- This scheme is possible when nodes communicate using CDMA, so that transmissions of each level can take place simultaneously.
- The delay is  $O(\log N)$





# Chain-Based Three-Level Scheme



- For non-CDMA sensor nodes
- The chain is divided into a number of groups to space out simultaneous transmissions in order to minimize interference.
- Within a group, nodes transmit data to the group leader, and the leader fusion the data, and become the member to the next level.
- In the second level, all nodes are divided into two groups.
- In the third level, consists of a message exchange between one node from each group of the second level.
- Finally, the leader transmit a single message to the BS.





# Figure Chain-based three-level scheme



STEP 1



STEP 2



STEP 3



STEP 4



 Group leader