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Variation of node lifetime with transmit power

- There are few studies on the information dissemination rate and power consumption when increasing the radio transmission power.
- •When transmit power is high, the number of nodes that receive a single transmission increases
- •Improved information dissemination rate due to increased opportunities to receive
- Increasing the transmit power significantly increases the power consumption
- •Battery powered, directly related to node life

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Research Objectives

- Propose an information dissemination method that can achieve both high dissemination rate and low power consumption
 - •Consider the increase in transmit power
- •Reduce unnecessary transmissions by considering the status of neighboring nodes
- Evaluate the proposed method by simulation
 information dissemination rate
 Power consumption used for wireless transmission and
- Power consumption used for wireless transmission and reception across the network.

Gossip method • The node where the message to be dispersed occurred. • Broadcast and send a message to all neighboring nodes • Node that received the message • Message received for the first time is broadcast with a certain probability. • Messages that were already received do nothing.

Existing information dissemination methods

Distribute the same message to all nodes that make up the network

 Information dissemination rate: Percentage of nodes that successfully received information out of all nodes.
 Increased number of transmissions to improve information dissemination rate
 Increased number of transmissions results in increased power consumption

•Methods based on received power, remaining battery power, etc. Existing methods have difficulty in achieving both high information dissemination rate and low power consumption.

Several methods have already been proposed

information dissemination

•flooding method •gossip method

- Introduce probability into transmissions to reduce the number of transmissions
- Difficult to set the appropriate transmission probability
 If the probability is too low, the information dissemination rate will
 - off the probability is too high, the number of transmissions cannot be reduced sufficiently

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Consideration of information dissemination situation

- The node sending the message waits for T_1 time •When a message identical to the one to be sent is received α times, transmission is aborted and terminated.
- •If it fails to receive the data α times, send the data. • Wait T_2 time after sending message •Ends when the same message is received β times from surrounding nodes T₁ Transmission waiting period If β is not reached, T₂ Retransmission waiting period retransmit up to γ times $B_1 = (2^{macMaxBE} - 1) \times aUnitBackoffPeriod$ $S_1 = SIFS + LIFS + B_1 + random(B_1) + CCA$ $T_1 = S_1 \times symboltime$ Number of receptions for α determining transmission cancellation
 - - Number of receptions for ß retransmissions
 - determining retransmission Maximum number of γ
- $\begin{array}{l} B_2 = (2^{BE}-1) \times aUnitBackoffPeriod \\ T_2 = (SIFS+LIFS+B_2+CCA) \times symboltime \end{array}$

BE = macMaxBE + 2





Change the transmission

number of hops from the starting node

• Change the transmission probability according to the

• Transmission probability decreases with distance from

 $p(x) = p_{min} + max\{\frac{(x-h_{th}) \times (1-p_{min})}{1-h_{th}}, 0\}$

probability

Gossip method

Proposed method

•Number of receptions

Broadcasting probability : 0.8

for determining transmission cancellation α : 2

•Maximum number of retransmissions γ: 1

•Number of receptions for determining retransmission β : 2









Since the proposed method decreases the number of transmissions when the

transmission power is increased Little or no increase in overall network power consumption



Conclusion

- Proposal of an information dissemination method that can achieve both high dissemination rate and low power consumption
 - •Control transmission by considering the status of neighboring nodes
 - •Varying the transmission probability based on the number of hops
- \bullet Results of simulation-based evaluation
 - •Increasing the transmission power of any method increases the information dissemination rate.
 - •The proposed method hardly increases the power consumption even when the transmission power is increased.

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