Analysis and Improvement of DSDV Protocol

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Abstract

An ad-hoc network is a group of mobile wireless nodes that cooperatively form a network among themselves without any fixed infrastructure. Each node in ad-hoc network forward packets for other nodes to allow nodes not within direct wireless transmission range to communicate. There has been considerable research on conserving power in the routing protocol. Although most of these researches focused on controlling the transmission power of the sender network interface. Increasing power consumption and packet storming within ad-hoc network is becoming a core issue for these low power mobile devices. This work focuses on an approach for energy conservation as well as reducing packet storming within the routing protocol of the ad-hoc network. A wireless network interface in sleep mode consumes less power than idle mode. In this work we propose an improvement on DSDV protocol to allow sleep mode to take part in communication of the ad-hoc network.

Keywords: Ad-hoc network, DSDV, Sleep mode

1. Introduction

An ad-hoc network is a group of mobile wireless nodes that cooperatively form a network among themselves without any fixed infrastructure. Each node in ad-hoc network forward packets for other nodes to allow nodes

not within direct wireless transmission range to communicate. Energy is a limiting factor in the successful deployment of ad hoc networks since nodes are expected to have little potential for recharging their batteries. In this chapter, we investigate the energy costs of wireless communication and discuss the mechanisms used to reduce these costs for communication in ad hoc networks. We then focus to reduce energy consumption during both active communication and idle periods in communication. There has been considerable research on conserving power in the routing protocol. Although most of these researches focused on controlling the transmission power of the sender network interface.

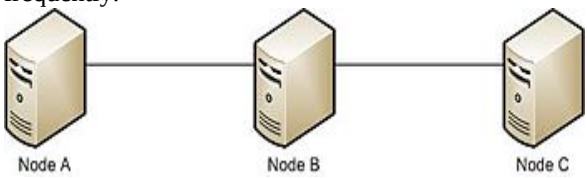
We address different problems in DSDV[1] protocols. In DSDV protocol nodes consumes more power, we use the concept of sleeping mode to reduce power consumption in this thesis.

Rest of the paper organized as follows. Section 2 describe the DSDV protocol , Section 3 describes the literature survey, different problems of DSDV is outlined in section 4, proposed protocol is given in Section 5 and section 6 presents conclusion and future work.

2. Destination-Sequenced Distance-Vector Routing (DSDV)

It is a table-driven routing scheme for ad hoc mobile networks based on the Bellman-Ford algorithm. It was developed by C. Perkinsand P.Bhagwat in 1994. The main contribution of the algorithm was to solve the routing loop problem. Each entry in the routing table contains a sequence number, the sequence numbers are generally even if a link is present; else, an odd number is used. The number is generated by the destination, and the emitter needs to send out the next update with this number. Routing information is distributed between nodes by sending *full dumps* infrequently and smaller incremental updates more

frequently.



For example the routing table of Node A in this network is

Destination	Next Hop	Number of Hops	Sequence Number	Install Time
A	A	0	A46	001000
B	B	1	B36	001200
C	B	2	C28	001500

Naturally the table contains description of all possible paths reachable by node A, along with the next hop, number of hops and sequence number.

3. Literature Survey

DSDV protocol[1] is silent about energy conservation at nodes that is every node in the network should be active all the time in the communication process even if some of them are not currently taking part in the data forwarding process. So that unnecessarily energy is wasted at the nodes.

Another problem in DSDV[1] protocol is packet storming that is even if there is no data communication taking place still control packets are transmitted among nodes consuming much of the bandwidth.

Increasing power consumption and packet storming within ad-hoc network is becoming a core issue for these low power mobile devices. This work focuses on an approach for energy conservation as well as reducing packet storming within the routing protocol of the ad-hoc network. A wireless network interface in sleep mode consumes less power than idle mode. In this work we propose an improvement on DSDV protocol to allow sleep mode to take part in communication of the ad-hoc network.

Each node in ad-hoc network forward packets for other nodes to allow nodes not within direct wireless transmission range to communicate. There has been considerable research on conserving power in the routing protocol. Although most of these researches focused on controlling the transmission power of the sender network interface. The network interface hardware at receiver node can operate in any of four different modes [3].

1. Transmit mode
2. Receive mode
3. Idle mode
4. Sleep mode

Transmit mode- a node is in transmitting mode when it goes to transmit packet.

Receive mode- When a node receive a packet.

Idle mode- When a node neither sends nor receive packet. This mode consumes power because the node has to listen network continuously in order to detect a packet that it should receive, so that node can then switch to receive mode.

Sleep mode- This mode has very low power consumption. The network interface at a node in sleep mode can neither transmit nor receive packet. It must be wake up to idle mode first by explicit information from the node.

Feeny[2] shows the specification and actual measured current drawn by one popular wireless network interface card in the four possible modes. Receive and idle mode require similar power, and transmit mode requires slightly greater power. Sleep mode requires more than an order of magnitude less power than idle mode. These measurements show that the network interface consumes similar energy, whether it is just listening or actually receiving data. Hence, intelligently switching to sleep mode whenever possible will generally create significant energy savings.

Our proposed protocol will solve above problem.

4 Problems of DSDV routing protocol-

- No sleeping nodes are used
- Overhead: most routing information never used
- It only considers hop count as metric but is not considering efficiency (processing speed) of nodes.
- It is also not considering the status (free/busy) of internal nodes.
- It is also silent about the convergence.

The protocol is unable to detect significant change in the network

5 Proposed protocol

Every node in network can interleave between sleep mode and idle mode. Sleeping condition of a node is the condition that every node in the network knows that the node is in sleep mode but that node will interleave between sleep mode and idle mode, during that sleeping condition without revealing to the network. A node can go to sleep mode when it will only receive control packet for some fixed amount of time. The time may not same for each node in the network that is every node will take a random amount of time.

When a node ready to go to sleep node it will transmit a control message indicating its address. When all other nodes receive that message will update their routing table by setting a flag for that node. After a node goingto sleep mode it will periodically wake up to idle mode but it will not revel this information to the network.

When a node is in sleeping condition and receives a sleep mode message of another node it will just update the table for that node but will not wake up.

When a node gets a request to wake up message (RW) then it will reveal that it is wake up by sending a wake up message containing its routing table information to its neighbors. It will remain in wake up state during data packet forwarding or receiving.

Sending and receiving

When a node is in sleeping condition and wants to transmit data to another node which is in wake up state then first it will wake up and broadcast wake up message along with current routing table information. When its neighbors get wake up message they will also wake up and also update its table and then according to current table information sender will send data packet.

When a node wants to send data to another node that is in sleeping condition then it will first broadcast RW message by Flooding. When any sleeping node receive that RW message will wake up and communicate as usually.

6 Conclusions and Future work

In this work we discussed on the problem of energy consumption and packet storming in DSDV and used the concept of sleeping mode, idle mode, transmit mode and receive mode to reduce energy consumption and packet storming unnecessarily when there is no data communication takes place. It also conserve energy at the nodes. These proposed improvements can be simulated for performance analysis by using ns-2 simulator.

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