Distributed Algorithm for Adaptive Opportunistic Routing in Wireless Sensor Network

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Abstract: Routing the packets is part of multi hop ad hoc wireless sensor network. Use adaptive opportunistic routing scheme. Opportunistic routing scheme that routes packets opportunistically in order to ensure that packet loss is avoided. Learning and routing are combined that explores the optimal routing possibilities. We use custom simulator for implementation that shows adaptive opportunistic routing to minimize cost of packet routing. Optimize routing of packets even though the network structure is unknown. There is some packet loss occurs due to poor wireless link. We cannot find that packet where it to be sent. Source and destination did not know about the sending route and receiving route. To overcome this, get acknowledgement about opportunistic route from source. Source manage the problem when destination find fault where get the source packet.

Keywords—Reinforcement learning,opportunistic routing,wireless sensor network,network.

I. Introduction

Recently there has been more research into the WANETs in order to overcome the problems with traditional routing, A novel forwarding technique based on geographical location of the nodes involved and random selection of the relaying node via contention among receivers. It focuses on the multihop performance of such a solution, in terms of the average number of hops to reach a destination as a function of the distance and of the average number of available neighbors. An idealized scheme (in which the best relay node is always chosen) is discussed and its performance is evaluated by means of both simulation and analytical techniques. A practical scheme to select one of the best relays is shown to achieve performance very close to that of the ideal case. Some discussion about design issues for practical implementation is also given. The goal is to exploit path diversity in the link layer by choosing the best next hop to forward packets when multiple next hop choices are available. Such choices can come from a multipath routing protocol, for example. This technique can reduce transmission retries and packet drop probabilities in the face of channel fading. An anycast extension of the IEEE 802.11 MAC layer based on this idea is implemented. The protocol in an experimental proof-of-concept test bed using the Berkeley motes platform and S-MAC protocol stack. It also implements it in the popular ns-2 simulator and experiment with the AOMDV multipath routing protocol and Rician fading channels. Any cast performs significantly better than 802.11 in terms of packet delivery, particularly when the path length is large or fading is substantial.

A network routing problem where a probabilistic local broadcast transmission model is used to determine routing. This model's key features, and note that the local broadcast transmission model can be viewed as soft handoff for an ad-hoc network are discussed. Here it present results showing that an index policy is optimal for the routing problem. Here it extend the network model to allow for control of transmission type, and prove that the index nature of the optimal routing policy remains unchanged. It present three distributed algorithms which compute an optimal routing policy, discuss their convergence properties, and demonstrate their performance through simulation. An ad hoc mobile network is a collection of mobile nodes that are dynamically and arbitrarily located in such a manner that the interconnections between nodes are capable of changing on a continual basis. In order to facilitate communication within the network, a routing protocol is used to discover routes between nodes. The primary goal of such an ad hoc network routing protocol is correct and efficient route establishment between a pair of nodes so that messages may be delivered in a timely manner. Route construction should be done with a minimum of overhead and bandwidth consumption. This article examines routing protocols for ad hoc networks and evaluates these protocols based on a given set of parameters. The article provides an overview of eight different protocols by presenting their characteristics and functionality, and then provides a comparison and discussion of their respective merits and drawbacks.

II. RELATED WORKS

With the sensitivity of optimal routing policies in ad hoc wireless networks with respect to estimation errors in channel quality, here we consider an ad hoc wireless network where the wireless links from each node to its neighbors are modeled by a probability distribution describing the local broadcast nature of wireless transmissions. These probability distributions are estimated in real-time. This investigation gives impact of estimation errors on the performance of a set of proposed routing policies. A distributed adaptive opportunistic routing scheme for multihop wireless ad hoc networks is proposed. The proposed scheme utilizes a reinforcement learning framework to opportunistically route the packets even in the absence of reliable knowledge about channel statistics and network model. This scheme is shown to be optimal with respect to an expected average per-packet reward criterion. The proposed routing scheme jointly addresses the issues of learning and routing in an opportunistic context, where the network structure is characterized by the transmission success probabilities. In particular, this learning framework leads to a stochastic routing scheme that optimally "explores" and "exploits" the opportunities in the network. Recent and increased interest of wireless mobile ad hoc networking motivates detailed examination of routing schemes specifically targeted for the demanding constraints that an unreliable, time varying and broadcast like wireless medium imposes. Incorporation and exploitation of radio characteristics are fundamental keys to successful and near optimal operation of routing schemes in a wireless environment. In this paper, forwarding methods for wireless mobile multihop networking in Rayleigh fading and non-fading channels are examined. An adaptive forwarding scheme denoted Selection Diversity Forwarding (SDF) is introduced and compared with two classical forwarding methods. It is shown that SDF presents significant performance improvements.

In particular and in contrast to the reference methods NFP and MFR, the performance of SDF is enhanced under fading channel conditions. It is found that local path adaptation has potential to perform better than routing approaches along a single path. The purpose of adaptive forwarding is to provide short-term responses to changes in propagation conditions and network topology in mobile store-and-forward wireless communication networks. The primary need for such short-term responses occurs during the time period between consecutive updates to the routing tables.

A new adaptive-forwarding protocol is described and evaluated for frequency-hop (FH) mobile wireless networks. The forwarding protocol operates in conjunction with adaptive routing and adaptive transmission to provide energy-efficient delivery of packets. Channel state information, which is developed in the receivers of the terminals in the network, is used to estimate the energy requirements of alternative routes for use in the routing protocol. For FH networks the channel state information consists primarily of counts of errors and erasures that are generated in the demodulators and decoders. Since channel state information may become outdated, especially for infrequently used links, it is desirable to provide a mechanism for occasionally testing links that have not handled packets recently. A feature of the new adaptive-transmission protocol is that it employs information packets, rather than control packets, to update the channel state information and thereby benefit the routing protocol without adding overhead traffic to the network load.

III.NETWORK MODEL

A network consists of two or more computers that are linked in order to share resources (such as printers and CDs), exchange files, or allow electronic communications. The computers on a network may be linked through cables, telephone lines, radio waves, satellites, or infrared light beams.

A network is any collection of independent computers that communicate with one another over a shared network medium. A computer network is a collection of two or more connected computers. When these computers are joined in a network, people can share files and peripherals such as modems, printers, tape backup drives, or CD-ROM drives. When networks at multiple locations are connected using services available from phone companies, people can send e-mail, share links to the global Internet, or conduct video conferences in real time with other remote users. When a network becomes open sourced it can be managed properly with online collaboration software.

As companies rely on applications like electronic mail and database management for core business operations, computer networking becomes increasingly more important. Every network includes:

- At least two computers Server or Client workstation.
- Networking Interface Card's (NIC)
- A connection medium, usually a wire or cable, although wireless communication between networked computers and peripherals is also possible.

- Network Operating system software, such as Microsoft Windows NT or 2000, Novell NetWare, Unix and Linux.

The client/server model is basically an implementation of distributed or cooperative processing. At the heart of the model is the concept of splitting application functions between a client and a server processor. The division of labor between the different processors enables the application designer to place an application function on the processor that is most appropriate for that function. This lets the software designer optimize the use of processors--providing the greatest possible return on investment for the hardware.

Client/server application design also lets the application provider mask the actual location of application function. The user often does not know where a specific operation is executing. The entire function may execute in either the PC or server, or the function may be split between them. This masking of application function locations enables system implementers to upgrade portions of a system over time with a minimum disruption of application operations, while protecting the investment in existing hardware and software.

Peer-to-peer networks are more commonly implemented where less than ten computers are involved and where strict security is not necessary. All computers have the same status, hence the term 'peer', and they communicate with each other on an equal footing. Files, such as word processing or spreadsheet documents, can be shared across the network and all the computers on the network can share devices, such as printers or scanners, which are connected to any one computer.

A. Equations

An opportunistic routing setting is assumed. We also assume a fixed transmission cost. At any given point of time only one route is capable of routing a packet. The termination condition is either the event which denotes successful packet receiving of dropping of packet. The termination time is considered as stopping time. Termination events are described.

The successful sending of packet to destination and the packet drop are two different things. However, both are considered to be termination events. The nodes are expected to participate the packet routing genuinely as they are given average per-packet reward. Such reward is computed as follow.

$$Jn=E[1/Mn\sum m=1Mn\{rm-\sum n=rsm-1mCin,m\}]$$

Here, I n, m indicates index of node at time n when sends packet m and C I n, m indicates cost measure. It will become zero when no packets are transmitted at time n. As per above equation , Mn the routing scheme of nodes can be seen for relaying packets m. In the above equation indicates number of packets terminated up to time n. In this model we are choosing relay of nodes i n,m in the absence of knowledge about network structure in a way that is to be maximum when N is increasing.

IV.EXISTING APPROACH

Implement reinforcement learning framework using custom simulator able to optimize routing of packets even network structure is unknown. Due to poor wireless, packet loss may occur and we cannot find that packet, where it to be sent because the sending route is to be unknown. Opportunistic routing mitigates the impacts of poor wireless link by exploiting the broadcast nature of wireless transmission and path diversity.

V. PROPOSED IMPLEMENTAION

Step1: Initializes required parameters. The user interface of a node has two tabs. The first tab provides node related details. The second node is related to the paths established as per the proposed adaptive opportunistic routing algorithm.
Step2: Transmit packets when a node is having packet. When a node is ready to send a packet, it will send through best path by calculations best scores and keeping record of vector score for that node. In future transactions, it will use the score for best path finding.
Step3: Opportunistic Routing is used to make routing decision. Routing decision at any given time is made based on the reception outcome and involves retransmission, choosing the next relay, or termination. When a particular node is not Wireless network, the system will route the packets by using another paths.
Step4: The Routing Message Passing phase is meant for significance the routing path to source node. The sender networks choose their opportunistic routing and then pass the information about routing to the source node.
Step5: The acknowledgement phase is meant for acknowledge the receiving of packet. Set of nodes which receives packet will communicate their id and max score. The acknowledgement sent from destination to source.

VI.CONCLUSION

Exploit adaptive opportunistic routing possibilities in order to reduce the average per-packet cost. This is achieved by providing rewards to the nodes that perform well in packet routing. Distributed nature of algorithm along with reward system has produced best results in routing of packets. By knowing route of packet sending, avoid packet loss.

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