Enhanced Opportunistic Routing for WSN's

C. Swetha* , K. Rajasekhar Reddy

 # Student of M.Tech, Computer Science and Engineering, SRTS, Kadapa, Andhra Pradesh, India

 # Department of CSE, Computer Science and Engineering, SRTS, Kadapa, Andhra Pradesh, India

***Abstract*— Selfish routing for multihop boom box broadside hoc networks has denotative of past at chronicle to overcome deficiencies of money-grubbing routing as applied in announce tuning. Motivated by Latin routing solutions in the Internet, conventional routing in propaganda hoc networks attempts to capture a lasting path along which the packets are forwarded. Such fixed-path craftiness backtrack from to approximately give of ambience respectability and opportunities provided by the air medium and result in unnecessary packet retransmissions. The opportunist routing decisions, in measure against, are bound in an online enterprise by alternative the take the place of scatter based on the existing transmit outcomes as tolerably as a rank ordering of neighboring nodes. Selfish routing mitigates the onus of base tranny delineation by exploiting the atmosphere courage of announce transmissions and the path diversity. The expedient algorithms brandish on a meticulous probabilistic chip divide up of wireless pull and innate topology of the strident. In a advisable setting, how on earth, these probabilistic models strive to be "learned" and "maintained."**

I. INTRODUCTION

In second paperback, a evident assess and judgement of Harry Machiavellian routing plan requires an innate approach to the issue of probability estimation. Authors furnish a sweetmeat breakdown for the exploitative routing algorithm. Regardless, by and lavish, the bid of background/estimating yield figures in joining back expedient routing remains unexplored. In this arrangement, we clever critique the function of opportunistically routing packets in a wireless multihop croaking in a jiffy blank or unpropitiously acquaintance of transmission success probabilities and raucous topology is available. Profit a aid civilization background , we hide a arise adaptive exploitative routing algorithm (d-AdaptOR) zigzag minimizes the accepted fitted per-packet cost for routing a packet from a source node to a destination. This is achieved by both sufficiently investigative the squeaky expend facts packets and exploiting the best routing opportunities. Our minor aid background ambiance allows for a low-complexity, low-overhead, present itself asynchronous implementation. The signiicant service mark of d-AdaptOR are zigzag it is far away somewhere to the crown awareness everywhere the network, it is distributed, and it is asynchronous. The indecent donation of this amalgam is to make consistent an opportunistic routing algorithm saunter: 1) assumes rarely knowledge respecting the fix matter and network, but 2) uses a succour learning circumstances in operation to entitle the nodes to quarter their routing strategies, and 3) optimally exploits the statistical opportunities and receiver diversity. In performance hence, we foundation on the Markov conclusiveness and an gonfalon assumption in Q-learning.

II PROPOSED SYSTEM

d-AdaptOR are that it is oblivious to the initial knowledge about the network, it is distributed, and it is asynchronous. The main contribution of this paper is to provide an opportunistic routing algorithm that:

1) Assumes no knowledge about the channel statistics and network.

2) Uses a reinforcement learning framework in order to enable the nodes to adapt their routing strategies,

3) Optimally exploits the statistical opportunities and receiver diversity.

III MODULAR DESIGN

Opportunistic routing for multihop wireless ad hoc networks has seen recent research interest to overcome deficiencies of conventional routing as applied in wireless setting. Motivated by classical routing solutions in the Internet, conventional routing in ad hoc networks attempts to find a fixed path along which the packets are forwarded. Such fixed-path schemes fail to take advantage of broadcast nature and opportunities provided by the wireless medium and result in unnecessary packet retransmissions. The opportunistic routing decisions, in contrast, are made in an online manner by choosing the next relay based on the actual transmission outcomes as well as a rank ordering of neighboring nodes. Opportunistic routing mitigates the impact of poor wireless links by exploiting the broadcast nature of wireless transmissions and the path diversity.

The opportunistic algorithms depend on a precise probabilistic model of wireless connections and local topology of the network. 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.

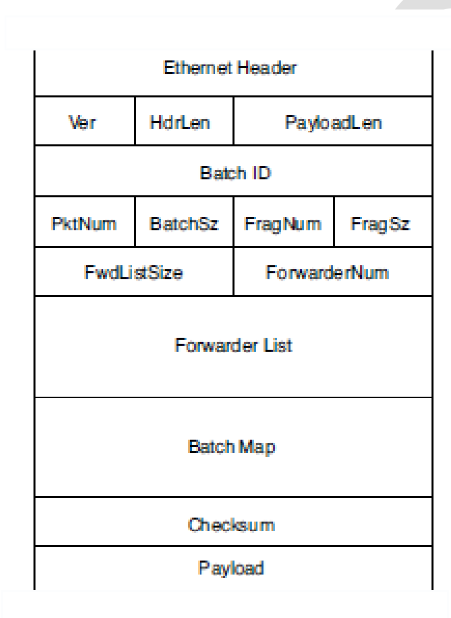
ExOR: Opportunistic MultiHop Routing for Wireless Networks

This paper describes ExOR, an integrated routing and MAC protocol that increases the throughput of large unicast transfers in multi-hop wireless networks. ExOR chooses each hop of a packet's route after the transmission for that hop, so that the choice can re°ect which intermediate nodes actually received the transmission. This deferred choice gives each transmission multiple opportunities to make progress. As a result ExOR can use long radio links with high loss rates, which would be avoided by traditional routing. ExOR increases a connection's throughput while using no more network capacity than traditional routing.

ExOR's design faces the following challenges. The nodes that receive each packet must agree on their identities and choose one forwarder. The agreement protocol must have low overhead, but must also be robust enough that it rarely forwards a packet zero times or more than once. Finally, ExOR must choose the forwarder with the lowest remaining cost to the ultimate destination.

Measurements of an implementation on a 38-node 802.11b test-bed show that ExOR increases throughput for most node pairs when compared with traditional routing. For pairs between which traditional routing uses one or two hops, ExOR's robust acknowledgments prevent unnecessary retransmissions, increasing throughput by nearly 35%. For more distant pairs, ExOR takes advantage of the choice of forwarders to provide throughput gains of a factor of two to four.

Each ExOR node maintains state for each batch of packets in which it is participating, as indicated by the node's presence in the batch's forwarder list. Nodes begin keeping state after receiving a single packet. The packet bu®er stores the successfully received packets in the current batch. The local forwarder list contains a copy of the prioritized list of nodes, copied from one of the packets in the packet buffer. For a given batch, all nodes use the same forwarder list, originally generated by the source. The forwarding timer indicates the time at which the node predicts that it should start forwarding packets from its packet bu®er. The node sets the timer far enough ahead to give higher-priority nodes enough time to send. The node adjusts the timer when it hears other nodes' packets. The transmission tracker records the measured rate at which the currently sending node is sending, along with the expected number of packets it has left to send. The node uses this information to adjust the forwarding timer. The batch map indicates, for each packet in a batch, the highest-priority node known to have received a copy of that packet.



ExOR packet header format.

The ExOR header follows the Ethernet header, and is followed by the packet's data. All ExOR packets are broadcasts. The Ver field indicates the current ExOR version, in case of future protocol changes. The HdrLen and PayloadLen fields indicate the size of the ExOR header and payload respectively. The BatchID field indicates which batch the packet belongs to. The PktNum is the current packet's offset in the batch. This o®set corresponds to the batch map entry for the packet. The BatchSz indicates the total number of packets in the batch. FragSz indicates the size of the currently sending node's fragment (in packets), and FragNum is the current packet's offset within the fragment. The FwdList- Size field specifies the number of forwarders in the list, and the ForwarderNum is the current sender's offset within the list. The Forwarder List is a copy of the sender's local forwarder list. The source and destination are specified in the forwarder list. The Batch Map is a copy of the sending node's batch map; in order to save space, each entry is an index into the Forwarder List rather than a full IP address. Towards Throughput and Delay Optimal Routing for Wireless Ad-Hoc Networks The design of routing protocols for wireless adhoc networks is guided by the dual requirements of throughput optimality and minimum delay. Lately, there has been a movement from the traditional routing approach, which identifies a best path to the destination before transmission and routes all the packets through it, to opportunistic approaches which make routing decisions adaptively based on actual transmission outcomes. We compare the stable rate region of both the approaches and find, interestingly, that opportunistic routing schemes do not always support a larger stable-rate region than traditional routing protocols. Backpressure based schemes are known to be throughput optimal but compromise on delay performance instead. We study the behavior of various schemes and propose a routing policy that considers both the goals of throughput optimality and minimizing expected delay in its design.

Optimal Backpressure Routing for Wireless Networks with Multi-Receiver Diversity

In this paper, we consider a multi-node, multi-hop wireless network with “unreliable” channels. Each transmission link has an associated error probability that may vary with time due to external factors such as environment changes or user mobility. Many previous studies assume that accurate channel information is available so that error probabilities are relatively small and can be neglected. However, in this work we consider the opposite case where precise channel information is difficult or impossible to obtain, but where simple estimates of channel quality can be made based on limited channel feedback. A motivating example is an underwater sensor network that uses acoustic channels with large propagation delays. This is a particularly challenging environment due to time varying wave ripple, complex signal reflections between surface and ground, and large delay spreads. While it may not be practical to assume that an accurate channel quality can be determined at the time of packet transmission, it is reasonable to estimate the error probability based on past signal strength values and/or ACK/NACK history from previous transmissions.

In this paper, we design robust algorithms by exploiting the broadcast advantage of wireless networks. Specifically, our network model includes the fact that a single packet transmission might be overheard by a subset of receiver nodes within range of the transmitter. This creates a multi-receiver diversity gain, where the probability of successful reception by at least one node within a subset of receivers can be much larger than the corresponding success probability of just one receiver alone. Hence, it is desirable to design flexible routing algorithms that do not require a single “next hop” receiver to be specified in advance. Such algorithms can dynamically adjust routing and scheduling decisions in response to the random outcome of each transmission.

V TECHNICAL REQUIREMENTS

Software requirements of our system are:

1. Windows XP/ Windows 7 Operating System
2. Cloud (Eucalyptus)
3. J2SE
4. Net beans IDE
5. MySQL 5.5 server
6. Glassfish Server.

As far as the hardware requirements are concerned, one needs to have a Pentium 4 processor or later with a minimum RAM of 1GB and a HDD of 80GB or more. It should also have a well-equipped network adapter. The user would require an machine with internet access & JVM installed on it.

VI CONCLUSION

In this work, we proposed d-AdaptOR, a distributed, adaptive, and opportunistic routing algorithm whose performance is shown to be optimal with zero knowledge regarding network topology and channel statistics. More precisely, under idealized assumptions, d-AdaptOR is shown to achieve the performance of an optimal routing with perfect and centralized knowledge about network topology, where the performance is measured in terms of the expected per-packet reward. Furthermore, we show that d-AdaptOR allows for a practical distributed and asynchronous 802.11 compatible implementation, whose performance was investigated via a detailed set of QualNet simulations under practical and realistic networks. Simulations show that d-AdaptOR consistently outperforms existing adaptive routing algorithms in practical settings.

VII. REFERENCES

[1] C. Lott and D. Teneketzis, “Stochastic routing in ad hoc wireless networks,”

in Proc. 39th IEEE Conf. Decision Control, 2000, vol. 3, pp. 2302–2307, vol. 3.

[2] P. Larsson, "Selection diversity forwarding in a multihop packet radio network with fading channel and capture," Mobile Comput. Commun. Rev., vol. 2, no. 4, pp. 47–54, Oct. 2001.

[3] M. Zorzi and R. R. Rao, "Geographic random forwarding (GeRaF) for ad hoc and sensor networks:Multihop performance," IEEE Trans. Mobile Comput., vol. 2, no. 4, pp. 337–348, Oct.–Dec. 2003.

[4] S. Biswas and R. Morris, "ExOR: Opportunistic multi-hop routing for wireless networks," Comput. Commun. Rev., vol. 35, pp. 33–44, Oct. 2005.

[5] S. Jain and S. R. Das, "Exploiting path diversity in the link layer in wireless ad hoc networks," in Proc. 6th IEEE WoWMoM, Jun. 2005, pp. 22–30.

[6] C. Lott and D. Teneketzis, "Stochastic routing in ad hoc networks," IEEE Trans Autom. Control, vol. 51, no. 1, pp. 52–72, Jan. 2006.

[7] E. M. Royer and C. K. Toh, "A review of current routing protocols for ad hoc mobile wireless networks," IEEE Pers. Commun., vol. 6, no. 2, pp. 46–55, Apr. 1999.

[8] T. Javidi and D. Teneketzis, "Sensitivity analysis for optimal routing in wireless ad hoc networks in presence of error in channel quality estimation," IEEE Trans. Autom. Control, vol. 49, no. 8, pp. 1303–1316, Aug. 2004.