DESIGN AND ANALYSIS OF AN OPPORTUNISTIC ROUTING PROTOCOL WITH CONGESTION DIVERSITY IN WANET'S

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Abstract

As we all know that wireless sensor networks are achieving a lot of user's attention towards its usage in terms of efficiency, accuracy and quick response time. Recently wireless adhoc networks(WAHNET's) is also becoming more familiar by combining the advantages of both mobile ad-hoc networks (MANETs) and infrastructure wireless networks because of their ultrahigh performance .Combining important aspects of shortest path and backpressure routing, this application provides a systematic development of a new distributed opportunistic routing policy with congestion diversity (D-ORCD) protocol. This proposed protocol is proved to be best with single destination, to calculate the over delay under admissible traffic. By conducting various experiments on our proposed protocol, we finally came to a conclusion that our proposed approach is best in sending dedicated packets to valid destination nodes under no congestion delay within the network

1. INTRODUCTION

OPPORTUNISTIC routing for multi-hop wireless ad hoc networks has long been proposed to overcome thendeficiencies of conventional routing [1]–[5]. Opportunisticm routing mitigates the impact of poor wireless links by exploiting the broadcast nature of wireless transmissions and the path diversity. More precisely, the opportunistic routing decisions are made in an online manner by choosing the next relay based on the actual transmission outcomes as well as a rank orderingdecision theoretic formulation for opportunistic routing and a unified framework for many versions of opportunistic routing n[1]–[3], with the variations due to the authors' choices of costs. In particular, it is shown that for any packet, the optimal routing decision, in the sense of minimum cost or hop-count, is to select the next relay node based on an index. This index is equal to the expected cost or hop-count of relaying the packet along the least costly or the shortest feasible path to the destination. When multiple streams of packets are to traverse the network, however, it might be desirable to route some packets along longer or more costly paths, if these paths eventually lead to links that are less congested. More precisely, as noted in [6], [7], the opportunistic routing schemes in [1]–[5] can potentially cause severe congestion and unbounded delay (see the examples given in [6]). In contrast, it is known that an opportunistic variant of backpressure [8], diversity backpressure routing (DIVBAR) [7] ensures bounded expected total backlog for all stabilizable arrival rates. To ensure throughput optimality (bounded expected total backlog for all stabilizable arrival rates), backpressure-based algorithms [7], [8] do something very different from [1]–[5]: rather than using any metric of closeness (or cost) to the destination, they choose the receiver with the largest positive differential backlog (routing responsibility is retained by the transmitter if no such receiver exists). This very property of ignoring the cost to the destination, however, becomes the bane of this approach, leading to poor delay performance in low to moderate traffic (see [6]).

Other existing provably throughput optimal routing policies [9]–[12] distribute the traffic locally in a manner similar to DIVBAR and hence, result in large delay. Recognizing the shortcomings of the two approaches, researchers have begun to propose solutions which combine elements of shortest path and backpressure computations [7], [13]–[15]. In [7], E-DIVBAR is proposed: when choosing the next relay among the set of potential forwarders, E-DIVBAR considers the sum of the differential backlog and the expected hop-count to the destination (also known as ETX). However, as shown in [6], E-DIVBAR does not necessarily result in a better delay performance than DIVBAR. The main contribution of this paper is to provide a distributed opportunistic routing policy with congestion diversity (D-ORCD) under which, instead of a simple addition used in E-DIVBAR, the congestion information is integrated with the distributed shortest path computations of [4]. A comprehensive investigation of the performance of D-ORCD is provided in two directions:

We provide detailed simulation study of delay performance of D-ORCD. We also tackle some of the system-level issues observed in realistic settings via detailed QualNetsimulations. We show that D-ORCD exhibits better delay performance than state-of-the-art routing policies with similar complexity, namely, ExOR, DIVBAR, and E-DIVBAR. We also show that the relative performance improvement over existing solutions.Combining important aspects of shortest path and backpressure routing, this paper provides a systematic development of a distributed opportunistic routing policy with congestion diversity (D-ORCD). D-ORCD uses a measure of draining time to opportunistically identify and route packets along the paths with an expected low overall congestion. D-ORCD with single destination is proved to ensure a bounded expected delay for all networks and under any admissible traffic, so long as the rate of computations is sufficiently fast relative to traffic statistics.

In the existing system we try to use the elastic routing technique for sending packets from a valid source node to the destination node. In the elastic routing scheme there will be two main parameters like indegree and out degree for each and every node. In a network, each and every node will have a direct in direct link from one terminal to other terminal in order to reach for the valid destination node.So in the elastic routing the nodes which are pointing towards that node is known as in degree and the nodes or links that are pointing to other from that exact node is known as out degree.So there are many limitations that takes place in existing routing system like data loss and packet delay at the time of node revocation.The main contribution of this application is to provide a distributed opportunistic routing policy with congestion diversity (D-ORCD) under which data will be transferred in a Shortest path computations . In our proposed system the data is initially divided into packets and where each and every packet transmission can be overheard by a sequence of intermediate nodes that are available in the router among which the next relay is selected opportunistically. Combining important aspects of shortest path and backpressure routing, this application provides a systematic development of a new distributed opportunistic routing policy with congestion diversity (D-ORCD) protocol.

2. LITERATURE SURVEY

INRODUCTION

Literature survey is the most important step in software development process. Before developing the tool, it is necessary to determine the time factor, economy and company strength. Once these things are satisfied, ten next steps are to determine which operating system and language used for developing the tool. Once the programmers start building the tool, the programmers need lot of external support. This support obtained from senior programmers, from book or from websites. Before building the system the above consideration r taken into for developing the proposed system.

RELATED WORK

1. P. Larsson, "Selection diversity forwarding in a multihop packet radio network with fading channel and capture," ACM SIGMOBILE Mobile Comput. Commun. Rev., vol. 5, no. 4, pp. 47–54, Oct. 2001.

Authors: Peter LarssonEricsson Research, Stockholm, Sweden

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 nonfading 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.

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

Authors: Sanjit Biswas and Robert Morris

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 reflect 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.

3. C. Lott and D. Teneketzis, "Stochastic routing in ad hoc networks," IEEE Trans. Autom. Contr., vol. 51, pp. 52–72, Jan. 2006.

Authors: Abhijeet A. Bhorkar, Mohammad Naghshvar

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

3. EXISTING SYSTEM

In the existing system we try to use the elastic routing technique for sending packets from a valid source node to the destination node. In the elastic routing scheme there will be two main parameters like indegree and out degree for each and every node. In a network, each and every node will have a direct in direct link from one terminal to other terminal in order to reach for the valid destination node.So in the elastic routing the nodes which are pointing towards that node is known as in degree and the nodes or links that are pointing to other from that exact node is known as out degree.So there are many limitations that takes place in existing routing system like data loss and packet delay at the time of node revocation.

LIMITATION OF EXISTING SYSTEM

The following are the limitation of existing system. They is as follows:

1) The existing system didn't concentrated on the property of cost (I.e. Weight) to the destination, however, becomes the bane of this approach, leading to poor delay performance in low to moderate traffic.
2) In the existing system if there was any node revocation occurred in the network ,entire architecture need to be changed and hence it is a delay process.
3) If the node which has very shortest distance to reach the destinaton has less number of in degree or out degree count then such a node cant be able to participate in the process of routing.
4) There was a huge delay performance in the existing routing technique.
5) There was no concept like opportunistic routing in the existing system.
6) In the current overlay networks there was no facility like monitoring and detecting the routing problems the activities of communicating nodes between each other.
7) In the existing BGP protocol, it mainly concentrates only on providing best path for communicating but failed in providing the alternate path at the time of node collision.

4. PROPOSED SYSTEM

The main contribution of this application is to provide a distributed opportunistic routing policy with congestion diversity (D-ORCD) under which data will be transferred in a Shortest path computations . In our proposed system the data is initially divided into packets and where each and every packet transmission can be overheard by a sequence of intermediate nodes that are available in the router among which the next relay is selected opportunistically. Combining important aspects of shortest path and backpressure routing, this application provides a systematic development of a new distributed opportunistic routing policy with congestion diversity (D-ORCD) protocol.

ADVANTAGES OF THE PROPOSED SYSTEM

The following are the advantages of the proposed system. They are as follows:

1. BY using this D-ORCD algorithm we can achieve the guarantee packet delivery under any type of attacks occurred in the router.

2. BY using this proposed D-ORCD algorithm we can achieve high level of accuracy in packets delivery rate

3. By using this proposed mechanism ,a lot of delay in packets delivery is reduced.

Here we can able to encrypt the data and then we can able to forward the data to the destination node so that data will not be viewed by anyone who is present in the intermediate network level.

5. SOFTWARE PROJECT MODULES

Implementation is the stage where the theoretical design is converted into programmatically manner. In this stage we will divide the application into a number of modules and then coded for deployment. We have implemented the proposed concept on Java programming language with JSE as the chosen language in order to show the performance this proposed Mixed Stegnography. The application is divided into 5 modules. They are as follows:

1) Service Provider Module

2) Adhoc Router Module

3) Network Module

4) Receiver Module

5) Node Failure Module

Now let us discuss about each and every module in detail as follows:

5.1 SERVICE PROVIDER MODULE

In this module, the service provider will browse the data file path and then send to the particular receivers. Service provider will send their data file to Adhoc router and router will connect to networks, in a network smallest distance node will be activated and send to particular receiver (A, B, C…). And if any jammer node will found, then service provider will reassign the energy for node.

5.2 ADHOC ROUTER MODULE

The **Adhoc** Router manages a multiple networks (network1, network2, network3, and network4) to provide data storage service. In network n-number of nodes (n1, n2, n3, n4…) are present, in networks every node consists of distance and energy. In a network shortest distance node will communicate first. The service provider can assign energy for node, view energy for all networks and node history details (view routing path, view boundary nodes, view jamming nodes & view total time delay) in router. Router will accept the file from the service provider and then it will connect to different networks; the all networks are communicates and then send to particular receiver. In a router we can view time delay, jammed nodes and also routing path.

5.3 NETWORK MODULE

In this module the networks (network 1, network 2, network 3 and network 4) consists of n-number nodes. In networks every node consists of distance and energy. In a network shortest distance node will communicate first. The node consists of lesser energy then that node will be jammed by the jammers. And then it will forward to next lesser distance node within the network. In a network last node will be considered as boundary node. Here for every cluster there are set of intermediate nodes and each and every intermediate node contains a set of energy /bandwidth available for transmission of data from sender to receiver.

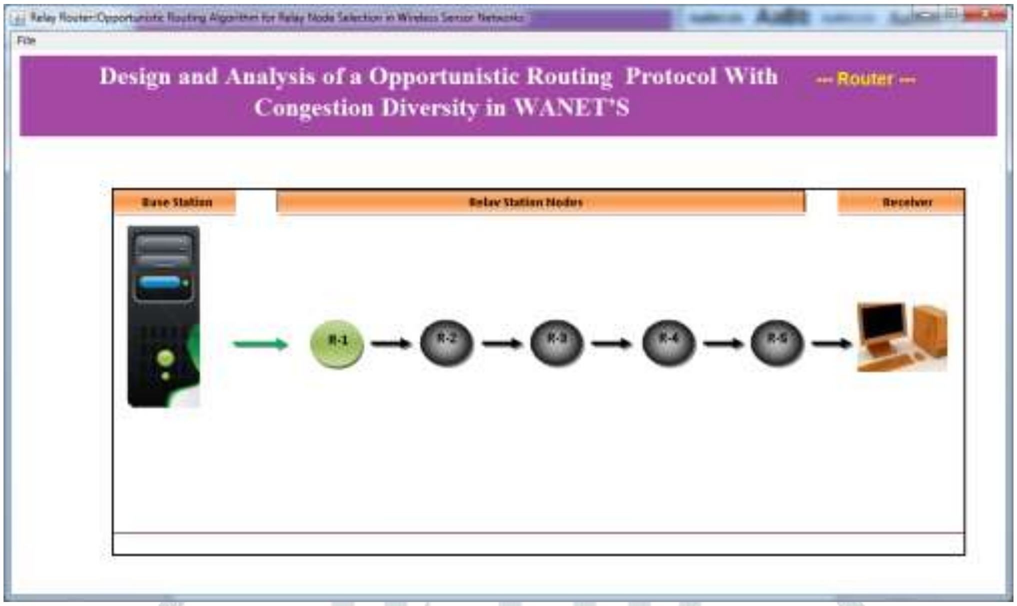
5.4 RECEIVER MODULE

In this module the networks (network 1, network 2, network 3 and network 4) consists of n-number nodes. In networks every node consists of distance and energy. In a network shortest distance node will communicate first. The node consists of lesser energy then that node will be jammed by the jammers. And then it will forward to next lesser distance node within the network. In a network last node will be considered as boundary node. Here for every cluster there are set of intermediate nodes and each and every intermediate node contains a set of energy /bandwidth available for transmission of data from sender to receiver.

5.5 NODE FAILURES MODULE

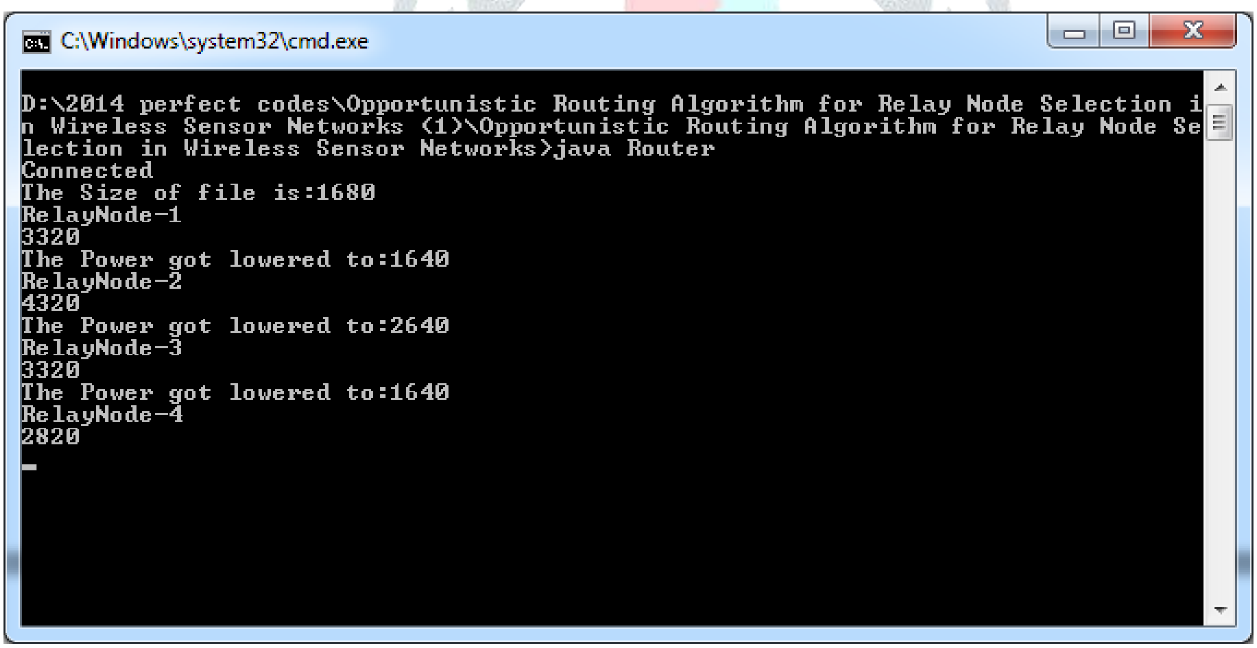
In this system, the lesser energy node will be considered as a failure node. Once the failure became active, affected nodes lost their neighbors partially or completely, lost all of their neighbors and became failure nodes. In our proposed application if any attacker try to create any attack for the nodes which are available in the router they will reduce the energy levels and once if any node energy is reduced automatically they will be identified as failure nodes inside the network and they can be identified on the router node.

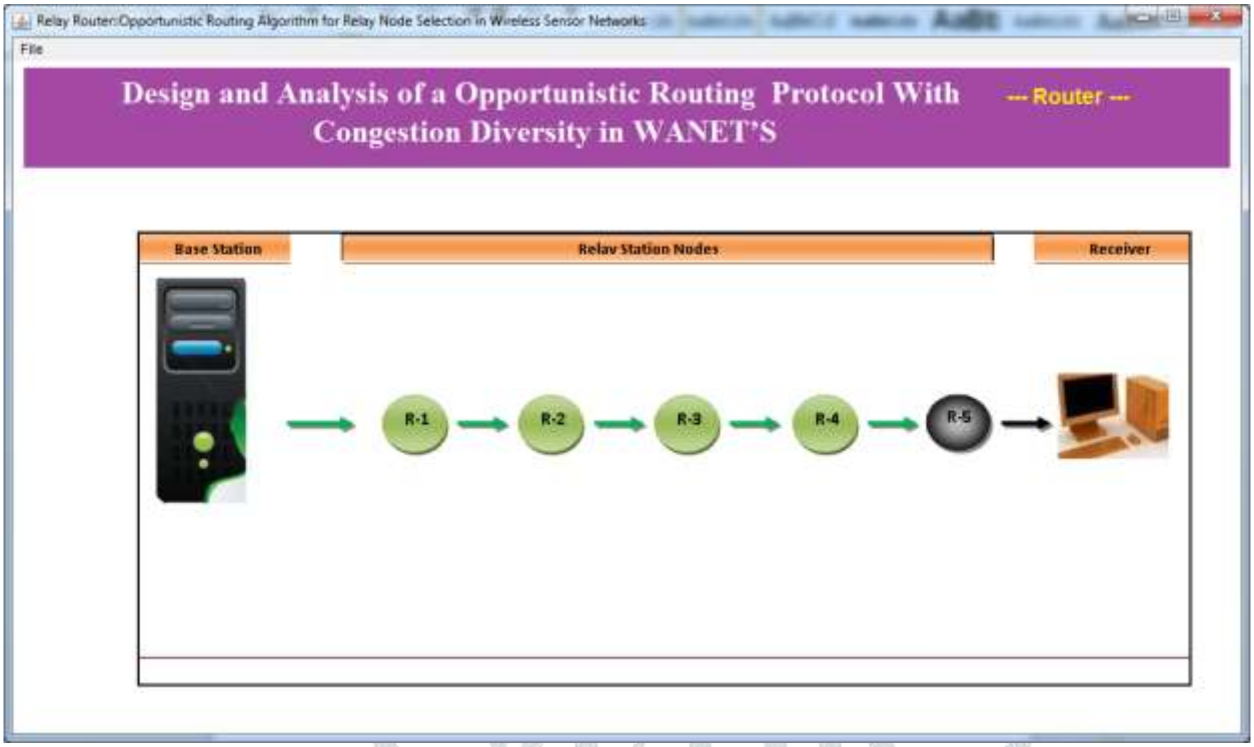
6. OUTPUT RESULTS



Packets are Sending Under Best Path

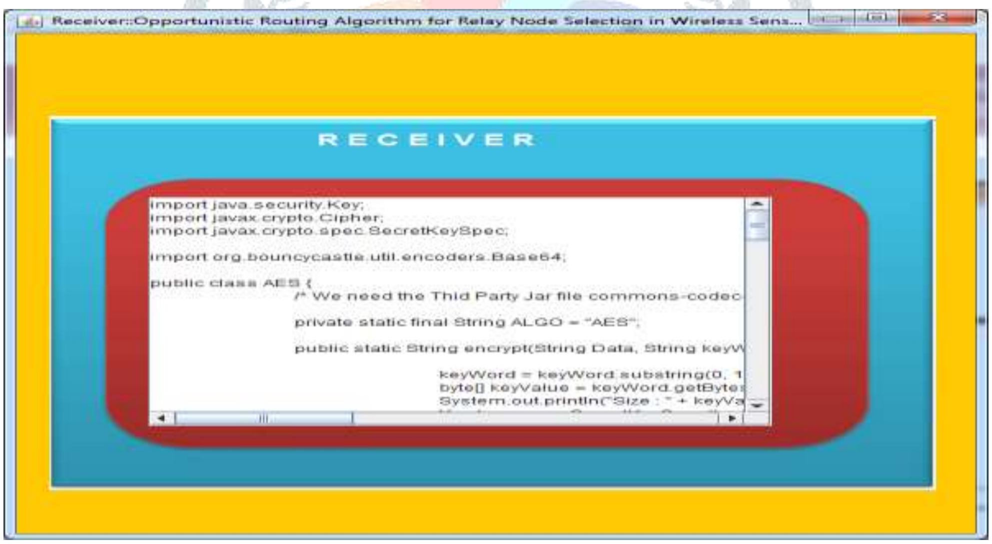
ROUTER TRY TO IDENTIFY THE Energy





Energy Path

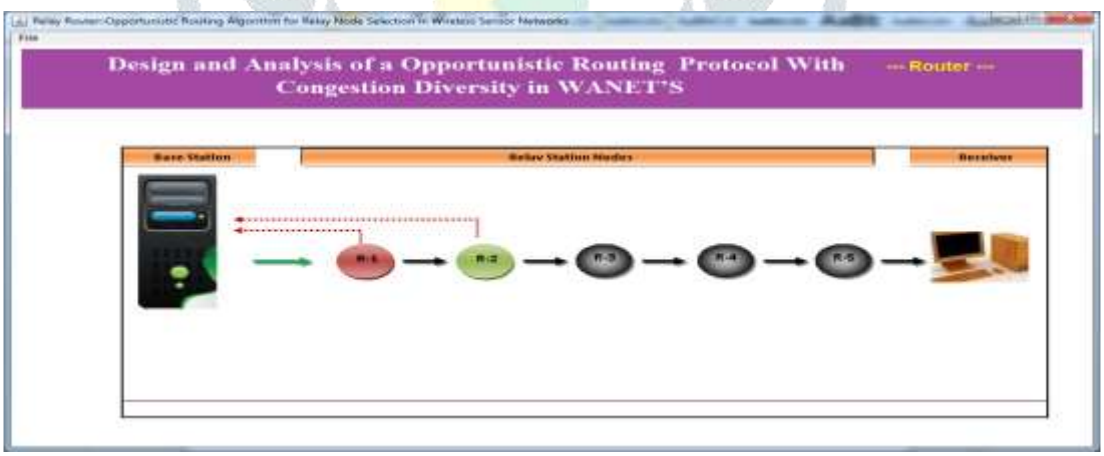
RECEIVER WILL RECEIVE THE DATA

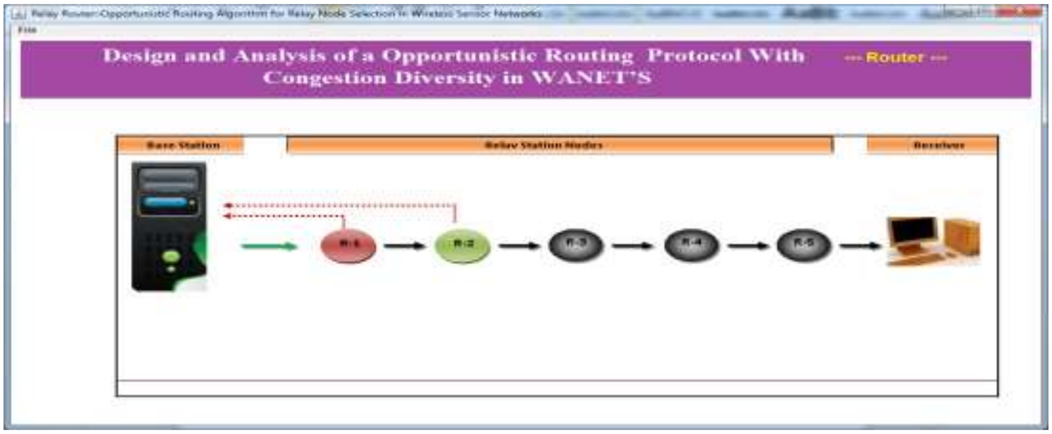


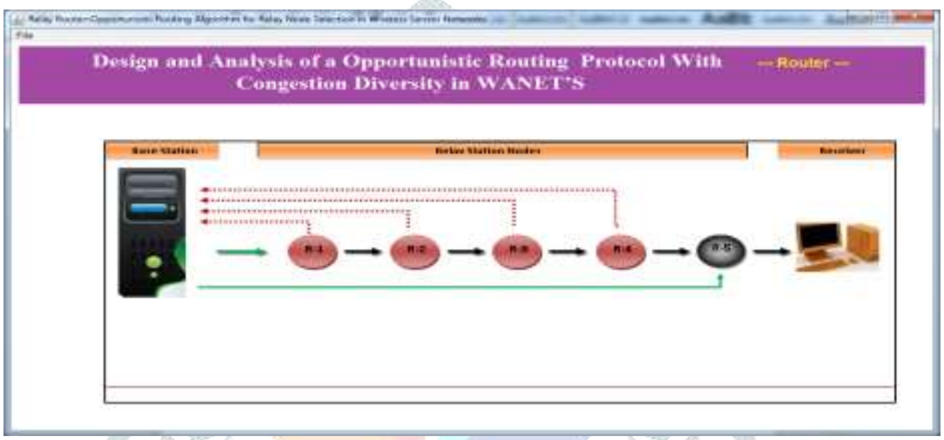
Receiver will receive the data

RECEIVER RECEIVES THE FILE

If any sensor has no energy or power inside the transfer







7. CONCLUSION

In this paper, we provided a distributed opportunistic routing by calculating the geographic parameters of that router.Here we try to find out the difference in how power consumption can be take place and how it is organized for sending data from sender to receiver under a dedicated path.if there is any attack or power loss within the network the opportunistic router will take energy from corresponding neighbor nodes and try to send the data without any loss.

8. REFERENCES

[1] P. Larsson, "Selection diversity forwarding in a multihop packet radio network with fading channel and capture," *ACM SIGMOBILE Mobile Comput. Commun. Rev.*, vol. 5, no. 4, pp. 47–54, Oct. 2001.

[2] 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, 2003.

[3] S. Biswas and R. Morris, “ExOR: Opportunistic multi-hop routing for wireless networks,” *ACM SIGCOMMComput. Commun. Rev.*, vol. 35, pp. 33–44, Oct. 2005.

[4] C. Lott and D. Teneketzis, “Stochastic routing in ad hoc networks,” *IEEE Trans. Autom. Contr.*, vol. 51, pp. 52–72, Jan. 2006.

[5] S. Jain and S. R. Das, “Exploiting path diversity in the link layer in wireless ad hoc networks,” in *Proc. WoWMoM*, 2005, pp. 22–30.

[6] P. Gupta and T. Javidi, “Towards throughput and delay optimal routing for wireless ad hoc networks,” in *Proc. Asilomar Conf.*, 2007, pp. 249–254.

[7] M. J. Neely and R. Urgaonkar, “Optimal backpressure routing for wireless networks with multi-receiver diversity,” *Ad Hoc Networks*, vol. 7, no. 5, pp. 862–881, Jul. 2009.

[8] L. Tassiulas and A. Ephremides, “Stability properties of constrained queueing systems and scheduling policies for maximum throughput in multihop radio networks,” *IEEE Trans. Autom. Contr.*, vol. 37, no. 12, pp. 1936–1949, Aug. 1992.

[9] S. Sarkar and S. Ray, “Arbitrary throughput versus complexity tradeoffs in wireless networks using graph partitioning,” *IEEE Trans. Autom. Contr.*, vol. 53, no. 10, pp. 2307–2323, Nov. 2008.

[10] Y. Xi and E. M. Yeh, “Throughput optimal distributed control of stochastic wireless networks,” in *Proc. 4th Int. Symp. Modeling and Optimization in Mobile, Ad Hoc, and Wireless Networks (WiOpt)*, 2006, pp. 1–10.

[11] B. Smith and B. Hassibi, “Wireless erasure networks with feedback,” arXiv: 0804.4298v1, 2008.

[12] Y. Yi and S. Shakkottai, “Hop-by-hop congestion control over a wireless multi-hop network,” *IEEE/ACM Trans. Netw.*, vol. 15, no. 1, pp. 133–144, Feb. 2007.

[13] L. Huang, S. Moeller, M. J. Neely, and B. Krishnamachari, “LIFObackpressure achieves near optimal utility-delay tradeoff,” in *Proc. 9th Int. Symp.Modeling and Optimization inMobile, Ad Hoc, andWireless Networks (WiOpt)*, 2011, pp. 70–77.

[14] L. Ying, S. Shakkottai, A. Reddy, and S. Liu, "On combining shortest-path and back-pressure routing over multihop wireless networks," *IEEE/ACM Trans. Netw.*, vol. 19, no. 3, pp. 841–854, Jun. 2011.

[15] E. Leonardi, M. Mellia, M. A. Marsan, and F. Neri, "Optimal scheduling and routing for maximum network throughput," *IEEE/ACM Trans. Netw.*, vol. 15, no. 6, pp. 1541–1554, Dec. 2007.

[16] M. Naghshvar, H. Zhuang, and T. Javidi, "A general class of throughput optimal routing policies in multi-hop wireless networks," *IEEE Trans. Inf. Theory*, vol. 58, pp. 2175–2193, 2012.