Detecting and Recovering Multi-Tap Route Failure in Ad-hoc network Using Zone-Based Routing Protocol

[1]Kumaran. C, [2]Ashok. P, [3]Dr. P. Purushothaman
[1, 2] PG Scholar (Computer Science and Engineering)
[1,3]SKP Engineering College, Thiruvannamalai, Tamil Nadu
[2]Sri Sai Ram Engineering College, Chennai, Tamil Nadu
[1]ashokit009@gmail.com

Abstract **- Ad hoc network is a temporary network connection that can change locations and configure itself on the fly. Packet may loss in network due to frequent link failure in ad hoc network. In this paper, we maintain log at each router to find out where the loss actually occur and a special scheme used is Zone routing protocol that uses the effective combination of proactive and reactive routing protocols. This protocol uses intra-zone and inter-zone protocol to route the packet to its destination without any loss.**

Keywords **- Log record, proactive, reactive, border casts.**

I.INTRODUCTION

The wireless ad hoc network does not have any kind of infrastructure to form network, due to this it had relative congestion in network which leading to packet buffering and continuously degrades the performance in network. In this paper, an *operationally viable* approach used to find out where the loss arises. The key idea is that detecting packet loss is to find where the packet lost in the network. Thus, when a broken link is detected, it performs intra-zone routing to find its destination. If not found it initiate border casts routing to find its destination.

Protocol

Each router maintain log that provides the information about each packet that passes through it. If the actual behavior deviates from the predicted behavior, then a failure has occurred.

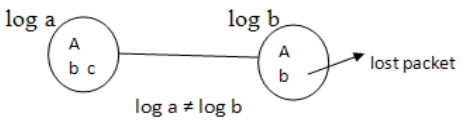

Fig 1

Below condition to be satisfied to detect where the packet has lost:

Buffer limit (BL) is maintained at each router. If BL<QP+ps, then the packet P is dropped due to congestion. Every log is evaluated with the previous one before it is forwarded. In our case, if log a ≠ log b, then rb stops forwarding packets further-detect failure.

Log Record

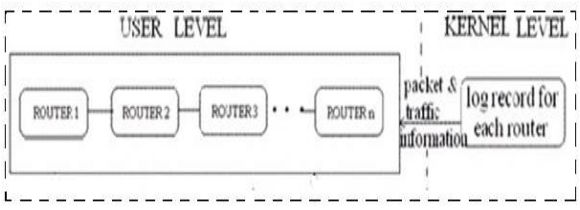

Fig 2

Each router in the network maintains a log record containing information about the number of packets sent and received (N), the size of each packet (ps), header of the packet (P), time at which the packet was received (t). This log record helps in detecting where the loss in packet occurred. Each router maintains a queue (Q) before it gets the particular packets. Buffer limit (BL) is maintained at each router. If BL< (qp+ps), then the packet P is dropped. When a packet arrives at router r and is forwarded to a destination that will traverse a path segment ending at router x, r increments an outbound counter associated with router x. Conversely, when a packet arrives at router r, via a path segment beginning with router x, it increments its inbound counter associated with router x. periodically, router x sends a copy of its outbound counters to the associated routers for validation. Then, a given router r can compare the number of packets that x claims to have sent to r with the number of packets it counts as being received from x, and it can detect the number of packet losses.

Zone- Routing Protocol

Zone Routing Protocol is a hybrid routing protocol which utilizes both the combination of proactive and reactive routing protocols. The key concept is to use a proactive routing scheme within a limited zone in the r-hop neighborhood of every node, and use a reactive routing scheme for nodes beyond this zone

Contrast of Proactive Vs Reactive

As a reactive, it finds a route On-Demand and it provide low overhead of control message and has disadvantage of higher latency in discovering routes. As a proactive, it finds a route in advance because it maintains table at each node about entire network.

Neighbor Discovery Protocol

Zone Routing Protocol uses its own protocol to find its neighbor's just by sending/transmitting "HELLO" message at regular interval. When any route failure occurs during a transmission of "HELLO" Packet a route error (RRER) message is propagated to source.

Routing in Zone Routing Protocol

- *Intra-Zone Routing*

  Each node has information about all the nodes in its routing zone. Each node has route table, it helps to find route to any node within limited zone. Each node periodically broadcast message called as Zone Notification message which is similar to HELLO message, it reach until it gets zero to find its destination.

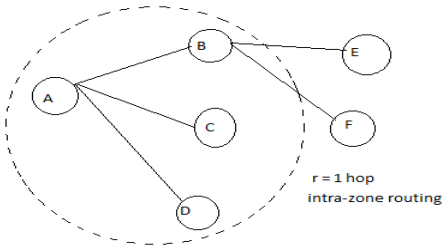

Fig 3 Intra-Zone routing

In fig 7.1.1 , it performs intra-zone routing with r=1, that says node A as source and nodes B, C, D are within intra-zone and each node checks whether it is destination or not , if node D is destination then it stop routing.

- *Inter-Zone Routing*

  Inter-Zone Routing discovers route reactively; if the destination is within zone the routing is completed in intra-zone routing phase otherwise it sends the packet to peripheral nodes through border casting. In Fig 3, source node A checks whether the destination is within intra-zone or not, if not it performs border casts from node B which connects peripheral nodes E and F. For getting reply, each and every node has its own address. Upon receiving border casts request from node B it find appropriate destination (r=2).

II.IMPLEMENTATION

- *Routing Zone*

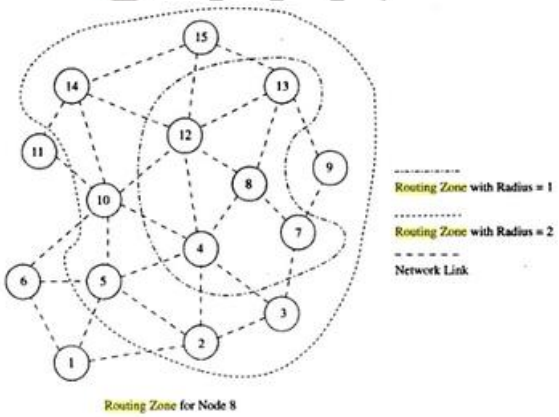

Fig 4 Routing Zone for node 8

It is subset of the network, in which all nodes are reachable within less than or equal to zone *radius* hops. In Fig 4 illustrates routing zone of node 8, with r=1 and r=2 hops. With zone radius =2, the nodes 7,4,12, and 13 are interior nodes, and whereas nodes 2, 3, 5, 9, 10, 13, and 15 are peripheral nodes. Each node maintains route information within its routing zone by periodic update route packets. Hence the larger the routing zone, the higher the update control traffic. The inter-zone routing protocol is responsible for finding paths to the nodes which are not within the routing zone.

- *Path Finding*
  When a source node 8 has to send packet to its destination node 15, first it checks whether the destination node is within its zone or not. If it has its own zone then it delivers the packet. Otherwise source border casts the RouteRequest message to its peripheral nodes. In fig 5, a node 8 border casts the RouteRequest message to nodes 2, 3, 5, 7, 9, 10, 13, 14, and 15. Suppose if peripheral node finds the destination within routing zone, it sends RouteReply to the source node about the path; otherwise node reborder casts the RouteRequest packet to peripheral nodes. This process continues until it finds its destination. Node 10 and 14 finds the information about node 16 within intra-zone routing tables, and it originate RouteReply packet back to source node 8. The path finding aim is to choose best path to route the packet from source to its destination. Shortest path and least delay path are two criterions for selecting the best path.

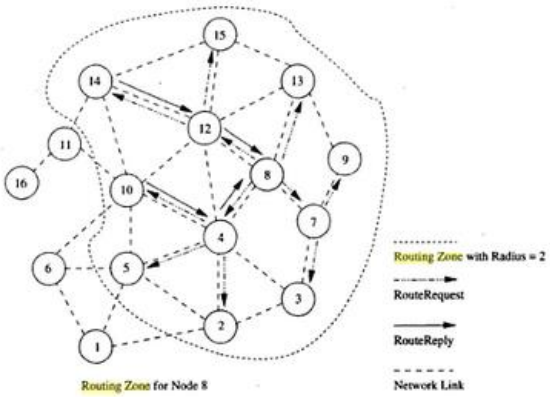

Fig 5 Path finding between node 8 and node 16

III. PERFORMANCE EVALUATIONS

Performance evaluations have following steps.

- *Throughput*
  The ratio of bits received to the amount of time taken to travel from source to destination.

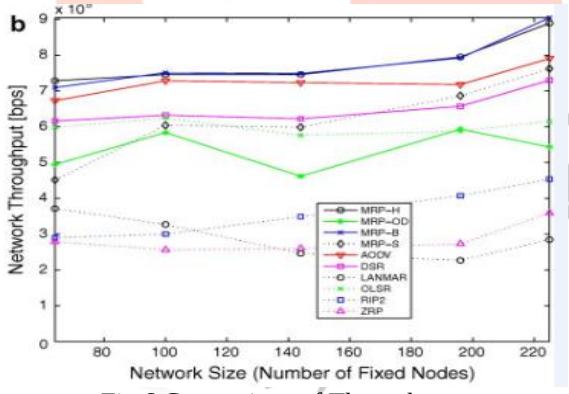

Fig 6 Comparison of Throughput

- *Router Overhead*
  The average amount of routing protocol control packets in the network.

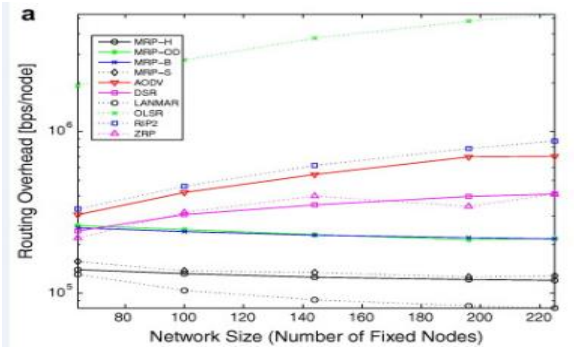

Fig 7 Comparison of Router Overhead

- *End -To-End Delay*

Time taken for a packet to be transmitted across a network from source to destination.

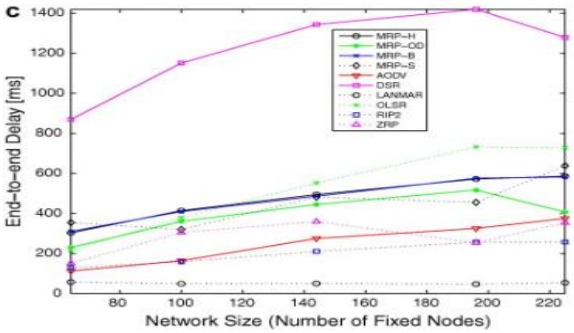

Fig 8 Comparison of End-to-end delay

IV.CONCLUSION

When link failure occur, there is a loss of packet in network, log record used to detecting where the packet loss occurred and it can be recovered by Zone Routing mechanism, which is simulated by using intra and inter zone routing. The simulation results show that this protocol reduces the control overhead and the periodic flooding of routing information packets in table-driven approaches.

REFERENCE

[1] R. Dube, C. D. Rais, K. Y. Wang, and S. K. Tripathi, "Signal Stability-Based Adaptive Routing for Ad Hoc Mobile Networks," IEEE Personal Communications Magazine, pp. 36-45, February 1997.

[2] Ashok, P.; Purushothaman, N.; Elumalai, K., "Detecting and temporarily recovering lost packets in Ad-hoc network by using Bypass routing," Radar, Communication and Computing (ICRCC), 2012 International Conference on , vol., no., pp.264,267, 21-22 Dec. 2012.

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

[4] Levente Buttyán, Jean-Pierre Hubaux "Simulating Cooperation in Adhoc Wireless Network" "Mobile Networks and Applications" October2003.8thvolume

[5] C.E Perkins and E.M Royer, "Ad Hoc On-Demand Distance Vector Routing," Proceeding of IEEE Workshop on Mobile Communication System and Applications 1999, pp. 90-100 Februaru 1999.

[6] V. Padmanabhan and D. Simon. Secure traceroute to detect faulty or malicious routing. In Proc. ACM SIGCOMM HotNets Workshop, Oct. 2002

[7] Kimaya Sanzgiri, Bridget Dahill, Brian Neil Levine, Clay Shields and Elizabeth M. Belding-Royer, "A Secure Routing Protocol for Ad Hoc Networks", in proc. of 10th International Conference on Network Protocol,November 2002

[8] M. K. Marina and S. R. Das, "On demand multipath distance vector routing in ad hoc networks," in IEEE International Conference of Network Protocols (ICNP), 2001.

[9] http://www.scribd.com/doc/37457740/Detecting-Malicious-Packet-Losses

[10] www.ecse.rpi.edu/ "router overhead "

[11] Hari, K.K.K., "On demand temporary route recovery for frequent link failures in adhoc networks," Trendz in Information Sciences & Computing (TISC), 2010 , vol., no., pp.181,185, 17-19 Dec. 2010 doi: 10.1109/TISC.2010.5714635

[12] Alper T. Mizrak, Stefan Savage and Keith Marzullo, "Detecting Malicious Packet Losses" IEEE TRANSACTIONS ON PARALLEL AND DISTRIBUTED SYSTEMS, VOL. 20, NO. 2, FEBRUARY 2009.

[13] Ashok. P, Satheesh .P. S, Karthikeyan. J, "Detecting and Recovering Link-Failure in Ad-hoc Network Using Signal Stability-Oriented Routing Protocol" International Journal of Engineering Research & Technology (IJERT), Vol. 2 Issue 4, p. 449-452, April – 2013,

[14] Z. J. Haas, "The Routing Algorithm for the Reconfigurable Wireless Networks," Proceedings of ICUPC 1997, Vol. 2, pp. 562-566, October 1999 Comparsion of proactive and reactive people.cs.vt.edu/~irchen/6204/pdf/lecture4-mobile-ad-hoc-**networks**.pdf

[15] Intra-zone routing , www.drrbpatel.org/lecture/CSE-302-ZRP-Protocol.ppt