Volume 6, Issue 4, April 2016 ISSN: 2277 128X
International Journal of Advanced Research in Computer Science and Software Engineering
Research Paper
Available online at: www.ijarcsse.com

Performance Optimization of CGSR for Mobile Ad-hoc Networks

Palwinder Jeet Kaur, Deepika Kalyan, Gunjan Aggarwal
Assistant Professor, Department of Computer Science and Engineering (MMEC) Maharishi Markandeshwar University, Mullana, Haryana, India

Abstract— This paper discusses about the issue of longest path and cluster head failure in CGSR protocol in an ad-hoc networks and compare the existing and proposed techniques result.

Keywords— MANET, CGSR, CH.

I. INTRODUCTION

Improve the performance of CGSR. The major idea behind the proposed technique is to provide shortest routing technique as well as if link between cluster head and base station breaks due to any reason like distance gap, link fails then we provide immediate cluster head for the continuously transmission of packets. We compare the performance of existing or proposed technique.

II. EXISTING TECHNIQUE

In the Existing cluster based protocol all the sensor nodes that has to communicate each other or transfer packets is possible only with the help of cluster head. The existing protocol doesn't follow any routing technique so many adjacent nodes are participating in network than needed, so there is loss of power of these nodes.

A. Sequence Diagram

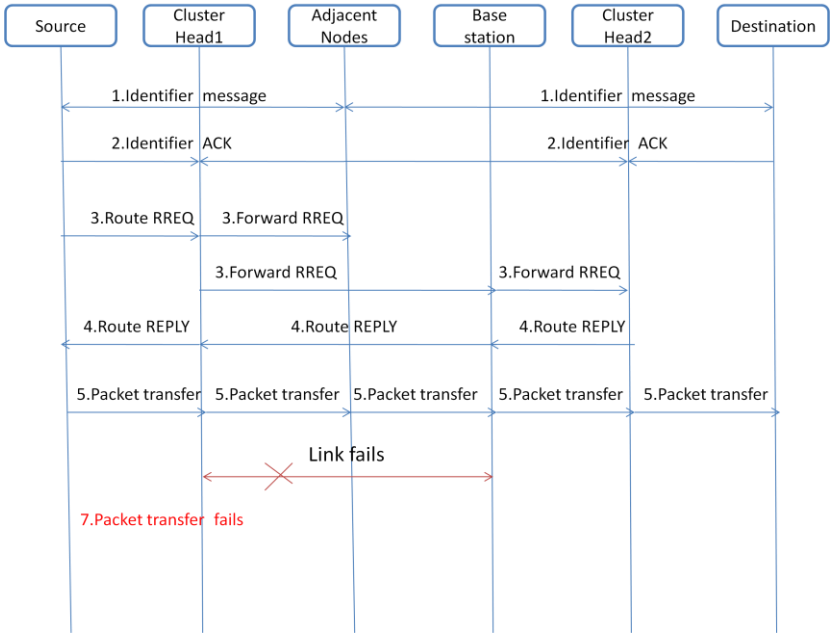

Fig 1 Sequence diagram of existing technique

III. PROPOSED TECHNIQUE

Step 1: Cluster Heads broadcasts identifier message to all other wireless sensor nodes (Adjacent Nodes). The adjacent nodes replies with identifier acknowledgement to the cluster head.
Step 2: The Cluster Head manages the routing table and also the details of all the nodes in its group. The Cluster Head also maintains details about other groups Cluster Head and its address with the help of Base station.
Step 3: The normal sensor node in a group maintains a table that contains information of its Cluster Head address and the common identifier generated by the Cluster Head.
Step 4: The address of the Cluster Head that has already involved in routing has stored in every packet, it is used for verification by other Cluster Head.
Step 5: When a source node in a need of route to deliver packets to the destination node, it sends Route Request message to the Cluster Head, the Cluster Head uses its common identifier to verify the packets.

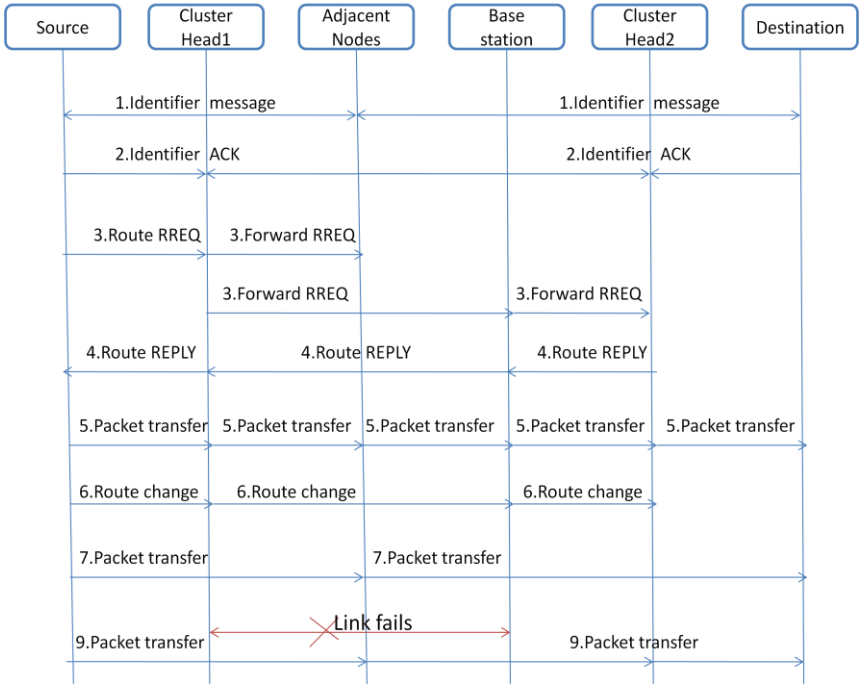

Fig 2 Sequence diagram of proposed technique

Step 6: The Cluster Head checks whether the destination node in its own cluster, if the destination node is present under its group, then it sends the packet directly. If the destination node is not in house then it sends Route Request message to Base Station, The Base Station intent passes it to the Cluster Head which manages the Destination node. The Cluster Head passes then passes packets to the Destination node.
Step 7: The sensor node under motion makes new route request to the Cluster Head, then Cluster Head passes the information to the base station. Source node and destination node under range directly communicates with each other with the help of adjacent nodes.
Step 8: If the source node detects destination node is under its range it sends route change request to cluster head and it starts sending packets directly to the destination node(shortest path) through nearby adjacent nodes.
Step 9: Suppose link with cluster head 1 fails, then packet transfer continues with other adjacent node under another cluster head.

A. Steps of Implementation

Step 1: Cluster Heads broadcasts identifier message to all other adjacent nodes. In figure 3.2 we have two cluster head i.e. CH1 and CH2.The CH1 contains three cluster members i.e. node S, node 5, node 6 and two gateways i.e. node 2 and node 1. The CH1 send identifier message to node S, node 5, node 6, node 2 and node 1. The CH2 contains three cluster member i.e. D node, node 3, node 4 and two gateways i.e. node 2 and node 1. CH2 send identifier message to D node, node 3, node 4, node 2 and node 1.

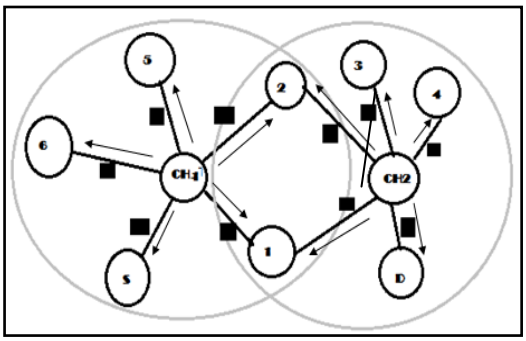

Fig 3 Cluster Heads broadcast identifier message to all adjacent nodes

The Cluster Head manages the routing table and also the details of all the nodes in its group. The Cluster Head also maintains details about other groups Cluster Head and its address with the help of Base station. The normal sensor node in a group maintains a table that contains information of its Cluster Head address and the common identifier generated by the Cluster Head. The address of the Cluster Head that has already involved in routing has stored in every packet, it is used for verification by other Cluster Head.
Step 2: Adjacent nodes i.e. 5, 6, S, 1, 2 send acknowledgement of identifier message to cluster heads CH1 and adjacent nodes i.e. 3, 4, D, 1, 2 to CH2.

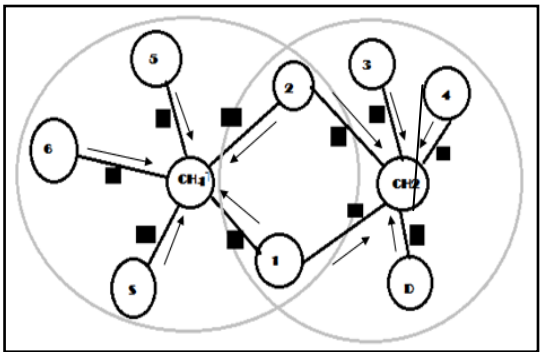

Fig 4 Adjacent nodes send acknowledgement to their cluster heads

Step 3: Node S wants to transmit packet to destination node D with the help of head nodes. The route from node S to node D is S-CH1-1-CH2-D, S-CH1-2-CH2-D, S-CH1-2-1-CH2 or S-CH1-1-2-CH2-D. Any one route chooses from the following to transmit the packets from S to D.

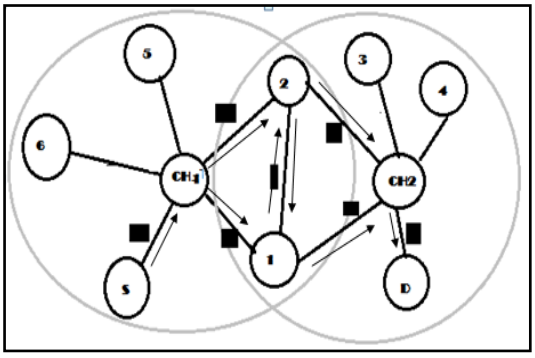

Fig 5 S transmit data packets to D

Step 4: Node S is in motion then the CH1 give command to source to transmit data through shortest path to destination. Explain in next step.

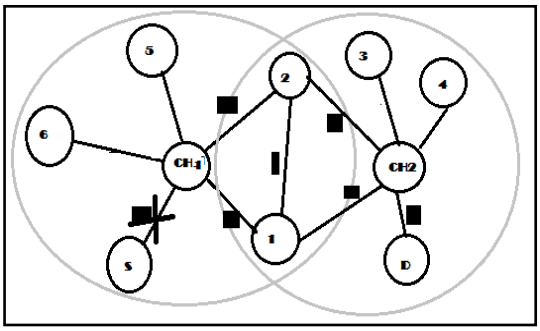

Fig 6 Node S not transmit data through CH1

Step 5: Now source S transmit packet without the help of head .S transmit data with help of adjacent node i.e. gateways .S transmit data from the any following route i.e. S-1-D, S-1-2-D, S-2-D, S-1-2-CH2-D and S-1-CH2-D. Route selection depends upon the shortest path between S and D. Now node S transmits data packets with the help of adjacent nodes shown in figure 3.5 S transmit data through the route i.e.S-1-D

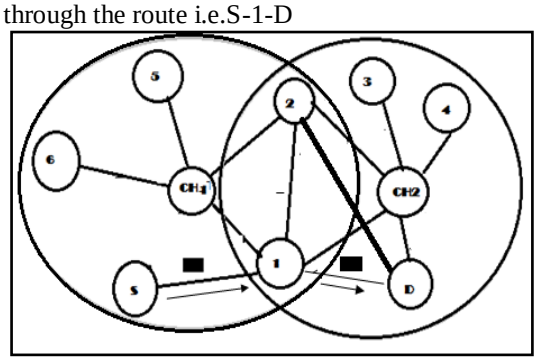

Fig 7 Node S transmit packet to D with the help of adjacent nodes

Now then node 5 transmits packet to D from the route i.e. 5-2-1-D.It is shortest path. If any node have shortest path then it transmit packet to its destination through the shortest path.

Main concept of the clustering is to aggregate and transfer data to cluster head but the advanced concept of clustering is to manage nodes under it and pass the relevant information to the base station, so it avoids the attacker intruding into the network.

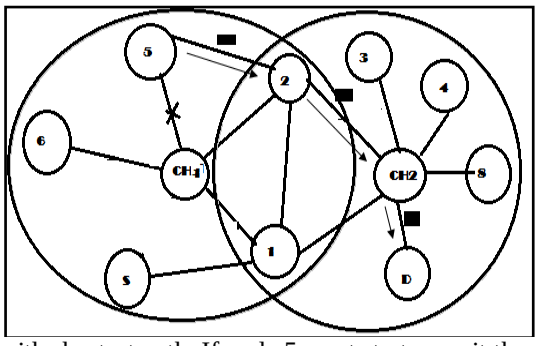

Fig 8 Node 5 transmit packet to D with shortest path. If node 5 wants to transmit the packet to node 3 then it transmit to the route i.e. 5-2-3.

B. Cluster Head Selection

The cluster heads manages the node and passes the nodes information to the base station.
The base station selects the cluster head based on the position and computing power of the nodes.
Suppose the source node started sending packet to the destination and the link with the cluster head fails either with base station or source node because of the distance gap or link failure
The alternative Cluster head takes account of source node information to base station, so the loss of packets is greatly reduced.

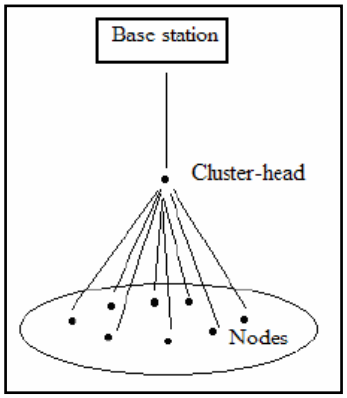

Fig 9 Cluster head connects with Base Station. Cluster head transmit information of all the nodes to the base station

In our scenario, the link with cluster head fails at 9.0 m/s and alternative cluster head is selected by base station in 9.1 m/s.

IV. RESULT

Graph for representing the comparison between existing and proposed technique.

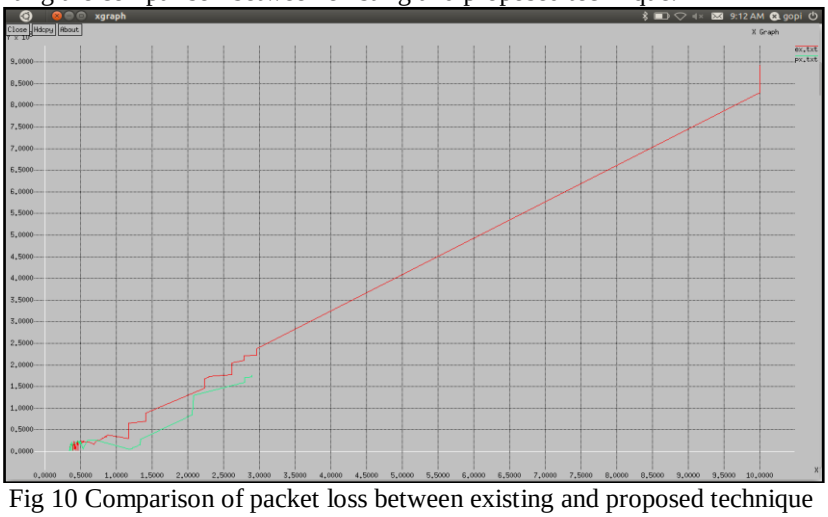

Fig 10 Comparison of packet loss between existing and proposed technique

Represent existing technique.
Represent proposed technique.

1. X axis= Size of Kbytes.
2. Y axis=time in m/s.
3. Green graph represent proposed system with less packet drop and Red graph represent existing technique with more packet loss.
4. For existing technique the packet loss is 10 kbps means 100% packet loss after the failure of link between cluster head and base station.
5. For proposed technique packet loss is 2.85 kbps means 28.5% packet loss.
6. The difference of packet loss between existing and proposed technique is 71.5%.The proposed technique decreases the 71.5% packet loss as compared to the existing technique.
7. Commands
   awk –f loss.awk existingsys.txt>ex1.txt
   awk –f loss.awk proposedlink.txt>pr1.txt
   8. xgraph commands
   xgraph ex1.txt pr1.txt geometry 800*400

V. CONCLUSION

In this dissertation we came to know that cluster based routing technique, is the best technique comparing to any other techniques. Because this technique decreases the packet loss apart from this provides the optimized path to reach destination rather than following longest path and select the new cluster head because of failure of any existing cluster head.

The drawback of existing technique is that entire communication is possible with the help of cluster head. So the initial route followed by the cluster head is used for transferring packets, so it is not the optimized technique. And also if the link of the cluster head fails with the base station then the entire packet transfer process fails.

The proposed system responds to the changes in the network and performs action but the existing system doesn't respond to the changes in the network. The major idea behind the proposed technique is to provide shortest routing technique as well as changes the action of cluster head. If link fails between cluster head and base station then another cluster head choose by base station and continue the transmission of packets between the source and destination.

VI. FUTURE WORK

In future this dissertation is made efficient to share the information in non reachable areas like loss of signal under subway, or between the mountains. The sensor nodes are included to the cloud infrastructure to enhance the computing power of the nodes and also to provide storage space to the sensor nodes.

REFERENCES

[1] W. *Heinzelman, A. Chandrakasan* and *H. Balakrishnan* **"**Energy efficient communication protocol for wireless micro sensor networks," in Proc. of the 33rd Annual Hawaii International Conference on System Sciences (HICSS), Maui, HI, Jan. 2012, pp. 3005 – 3014.

[2] *Amandeep Verma*, "A Study of Performance Comparisons of Simulated Adhoc Network Routing Protocols" Int.J. Comp.Tech.Appl , Vol 2 (3), 565-569.

[3] *Gibbons, R.J., Kelley, F.P.*, Key, P.B.: Dynamic Alternative Routing – Modelling and Behavior. Proceedings of the 12th International Teletraffic Conference (2011).

[4] *J. Broch, D.A. Maltz, D. B. Johnson, Y-C. Hu, J. Jetcheva,* "A performance comparison of Multi-hop wireless Adhoc networking routing protocols", in the proceedings of the 4th International Conference on Mobile Computing and Networking (ACM MOBICOM '98), October 2011, pages 85-97. Md.

[5] *Yongguang Zhang* and *Wenke Lee*, Security in Mobile Adhoc Networks, in Book Adhoc Networks Technologies and Protocols (Chapter 9), Springer, 2011.

[6] *V. Rodoplu*, and *T. Meng*, " Minimum energy mobile wireless networks," IEEE .j. Selected Areas in Communications, vol. 17, no. 8, pp. 1333-1344, Aug 2009.

[7] *S.L. Wu, Y.C. Tseng*, and *.j.P. Sheu*. "Intelligent medium access for mobile Adhoc networks with busy tones and power control." IEEE J. Selected Areas in Communications, vol. 18, no. 9, pp. 1647-1657, Sept 2010.

[8] Z. J. Hass and M. R. Pearlman, "Zone Routing Protocol (ZRP*)", C.R. Lin, M. Gerla*, Adaptive clustering for mobile wireless networks.

[9] .*Manjeshwar, D.P. Agrawal*, APTEEN: a hybrid protocol for efficient routing and comprehensive information retrieval in wireless sensor networks, in: Proceedings of the 2nd International Workshop on Parallel and Distributed Computing Issues in Wireless Networks and Mobile computing, Ft. Lauderdale, FL, April 2010.

[10] *Pham, P.P., Perreau, S.*: Performance Analysis of Reactive Shortest Path and Multi-path Routing Mechanism with Load Balance. IEEE INFOCOM (2011).

[11] *M.S. Corson, J.P. Maker*, and *J.H. Cernicione*, Internet-based Mobile Adhoc Networking, IEEE Internet Computing, pages 63–70, July-August 2010.

[12] *Lidong Zhou* and *Zygmunt J. Hass*, Securing Ad Hoc Networks, IEEE Networks Special Issue on Network Security, November/December 2011. Charles E. Perkins, Adhoc Networking, Chapter 7 ZRP by Zygmunt J. Haas & Marc R.Pearlman, Cornell University.

[13] *C.K.Toh*, "Maximum battery life routing to support ubiquitous mobile computing in wireless Adhoc networks," IEEE Communicolions Magazine, vol. 39, no. 6, pp. 138 -147, July 2008.

[14] *V. Rodoplu*, and *T. Meng*, " Minimum energy mobile wireless networks," IEEE .j. Selected Areas in Communications, vol. 17, no. 8, pp. 1333-1344, Aug 2011.

[15] *S.L. Wu, Y.C. Tseng*, and *.j.P. Sheu*. "Intelligent medium access for mobile Adhoc networks with busy tones and power control." IEEE J. Selected Areas in Communications, vol. 18, no. 9, pp. 1647-1657, Sept 2009.

[16] *Y.xue and B. Li*, "A location-aided power –aware routing protocol in mobile ad hoc networks," Proc. of Globecom' 2001, pp. 2837 -2841, San Antonio, TX, Sept 2010.

[17] *Dahill, B., Levine, B. N., Royer, E.*, Shields, C.: A Secure Routing Protocol for Adhoc Networks. Proceedings of 2002 IEEE International Conference on Network Protocols (ICNP). November (2010).

[18] *Yi, S., Naldurg*, P., Kravets, R.: Security-Aware Adhoc Routing Protocol for Wireless Networks. The 6th World Multi-Conference on Systemics, Cybernetics and Informatics, 2009.

[19] *Perkins, C., Belding-Royer, E., Das, S.*: Adhoc On-Demand Distance Vector (AODV) Routing. IETF RFC 3561, (2010).

[20] Pham, P.P., *Perreau, S.*: Performance Analysis of Reactive Shortest Path and Multi-path Routing Mechanism With Load Balance. IEEE INFOCOM (2008).

[21] *Lee, S.-J., Gerla, M.:* Split Multipath Routing with Maximally Disjoint Paths in Adhoc Networks. IEEE International Conference on Communications, Vol. 10(.2010)

[22] *Marina, M.K., Das, S.R.*: On-demand Multipath Distance Vector Routing in Adhoc Networks. Proceedings of the International Conference for Network Procotols (2011).

[23] *Singla Vikas, Singla Rakesh* and *Kumar Ajay* (2009). "Performance Evaluation and Simulation of Mobile Adhoc Network Routing Protocols", International Journal of Engineering and Information Technology.

[24] *Hsu J., Bhatia S., Takai M., Bagrodia R*. and *Acriche M.J*. "Performance of Mobile Adhoc Networking Routing Protocols in Realistic Scenarios" , Proceedings of IEEE Conference on Military Communications, Vol. 2, pp. 1268-1273.

[25] *Tyagi S S* and *Chauhan R K* (2010). "Performance Analysis of Proactive and Reactive Routing Protocols for Adhoc Networks", International Journal of Computer Applications, Vol. 1, No. 14, pp. 27-30.

[26] *S. A. Ade, P.A.Tijare* , "Performance Comparison of AODV, DSDV, OLSR and DSR Routing Protocols in Mobile Ad Hoc Networks", International Journal of Information Technology and Knowledge Management July-December 2010, Volume 2, No. 2, pp. 545-548.

[27] Marco Conti, Body, Personal and Local Ad Hoc Wireless Networks, in Book The Handbook of Ad Hoc Wireless Networks (Chapter 1), CRC Press LLC, 2010.

[28] *Anne Aaron, JieWeng*, Performance Comparison of Adhoc Routing Protocols for Networks with Node Energy Constraints International Journal of engineering and technology, EE 360 Class Project Spring (2012).

