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Comparison of Improved Routing Protocol (IPL_AOMDV) and Existing Routing Protocol (PL_AOMDV) For Wireless Ad-hoc Network

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Abstract- Multipath routing protocol is the most important aspect of Ad-Hoc network, the performance of Ad-hoc network mainly depends on routing protocol this paper address the problem of existing multipath routing protocol and also discussed the new routing protocol namely IPL_AOMDV, and also compare them in terms of Load balance, congestion control and power control parameter and found that IPL_AOMDV outperform the existing routing protocol in each aspect.

Keywords: Multipath routing Protocol, Load balancing, Power Control, Congestion control, IPL_AOMDV, PL_AOMDV Protocol, NS-2 Simulation.

1. INTRODUCTION

A multipath routing which avoids flooding and takes the benefit of both Load balancing and collision aware mechanism for energy conservation. Proactive routing protocol is preferred for the static network, but it is not advisable for the resource constrained ad-hoc network, because in proactive protocols each node broadcasts messages to the entire network if there is a change in the network topology to keep the updated information and hence incurs an extra overhead. So construct the route between source and sink when actually sink need the data from a particular source node. [15] IPL_AOMDV is independent paths, the independent paths is very important is multiple paths routing. In the multi-path routing, independent paths can be divided into node disjoint paths and link disjoint paths. Node disjoint path means there is not two same nodes in these paths. Link disjoint path refers to there is not same link along two paths. The paths not belong to these two are un-disjoint. Generally, the number of node

disjoint paths is less than that of link disjoint. IPL_AOMDV Protocol added route maintenance on paths to find network congestion or node energy in time, achieve bandwidth allocation of traffic adjustment. [9] With this requirement design a multipath routing Protocol algorithm for Wireless ad-hoc network. It also contains a load balancing algorithm to distribute the traffic over the multiple paths discovered. It attains the path diversity provided by the multi-path routing approach to increase the network life time by distributing the traffic over multiple node-disjoint paths. When an event triggers in the network the sensor nodes exchange information between themselves and one of the sensors is selected as the Source after the source initiates a route discovery process. Multipath routing protocol establishes multiple transmission paths between source node and destination node, which can not only transmit data in parallel, but also one as main path and others as backup paths.[14]

2. BACKGROUND

The goal of this study is to collect the information about networking parameter, networking routing protocols, what parameter used to improve the load balancing, congestion control of IPL_AOMDV Protocol.

The objectives of thesis is as following below

- To study the On-demand protocols in Ad hoc Networks.
- To add the scalability over both routing protocol.
- To improve load balancing in the routing protocol.
- To improve the average node lifetime in the routing protocol.
- To improve the congestion control of the routing protocol.
- To comparison the routing protocol in ad-hoc network.

3. Clustering parameters Clustering formation, clustering algorithms fulfill all conditions for clustering which are necessary for clustering in wireless ad-hoc network. There are some parameters which are important for whole clustering processor in wireless ad-hoc network; it gives detail about clustering formation. These clustering parameters are:

- **Load balancing:** Load-balancing clustering algorithms believe that there is an optimum number of mobile nodes that a cluster can handle, especially in a cluster head-based MANET. A too-large cluster may put too heavy of a load on the cluster heads, causing cluster heads to become the bottleneck of a MANET and reduce system throughput. A too-small cluster, however, may produce a large number of clusters and thus increase the length of hierarchical routes, resulting in longer end-to-end delay. Load-balancing clustering schemes set upper and lower limits on the number of mobile nodes that a cluster can deal with.
- **Power control**: Power control clustering is special case of cluster power. Power Clustering Provides implicit, adaptive, distributed clustering based on transmits power. Clustering is implicit because there are no cluster-head or gateway nodes. It is dynamic and distributed, because it is integrated with a routing protocol.
- **Congestion control**: congestion control algorithm slow start, congestion avoidance, fast retransmit and fast recovery. The first two mechanisms are used by a source node to control the data packets that is being sent into the network. The slow start is used at the beginning of a data transfer and after repairing the packet losses. When a data packet has to be transmitted, during the slow start, a TCP source starts increasing its (congestion window) cwnd by one and whenever it receives an ACK packet, the cwnd(congestion window) is incremented by an exponential growth and stops when the cwnd (congestion window) reaches slow start threshold. From now on, it deals with a congestion avoidance region, where cwnd (congestion window) is increased by one whenever an ACK is received until congestion is detected. When the congestion occurs, a TCP source reduces its transmission rate and invokes a slow start.

4. IPL_AOMDV (Improved Power Load Balancing ad-hoc on demand Multipath Distance Vector): IPL_AOMDV traffic balancing, routing protocol should perform traffic allocation on built multiple paths. The traffic strategy in the paper is as following. In the routing

searching, save bandwidth along the path and remaining power to routing reply packet. Source node computes traffic allocation of each path based on these three Parameters.

Route discovery: Route discovery Process in node s needs to communicate but there is not available routing, it initiates routing discovery process to broadcast routing request RREQ to all neighbors. The fields of BW (bandwidth) and LE (residual energy) in RREQ packet initialed values of source node. After intermediate node I received RREQ packets, it determines whether received repeated packet with same source address, destination address and request ID in source neighbor address field SN in time of path traversal time. When the destination node are received RREQ, it will extract Sources address SA and neighbor address SN and determine whether SA(Source address) and SN (Source neighbor address)from packet in list (SN Source neighbor)Send routing reply packet RREP to source node.

Route maintenance: IPL_AOMDV Protocol added periodic routing maintenance on paths to find network congestion or node energy Change in time, so as to achieve all bandwidth allocation of traffic adjustment. The processing on path failure of IPL_AOMDV is similar to that of AODV. After intermediate node find path failure to destination node it firstly send path failure message to source node and delete reverse paths to source node. If upper hop of some intermediate node to destination node, it send path failure message to source node and delete reverse Path to destination node. IPL_AOMDV does not perform route recovery Operation till there is no available Path from source to destination node.

5. PL_AOMDV (Power Load Balancing ad-hoc on demand Multipath distance Vector): PL_AOMDV is an ad-hoc on demand multipath distance vector multipath routing protocol.PL_ AOMDV is a compute multipath during route discovery. It is designed primarily for highly dynamic ad-hoc networks and links failure and route breaks. PL_AOMDV protocol is the use of routing information already available in the underlying AODV Protocol as much as Possible. PL_AOMDV (Ad-hoc On-demand Multipath Distance Vector) protocol is an enhance Version of AODV protocol. It finds multiple routes from source to Destination. It chooses the best route which has lower hop count as a primary path and rest of the paths are secondary paths for backup.

Route Discovery: When a traffic source needs a route to a destination, the source invokes a route discovery process by generating a network-wide Flooded RREQ. Route discovery phase source establishes a route to destination. In the end destination node receive route request (RREQ) message. They reply back route reply (RREP) message to that paths through different path from which RREQ have been received. Source node receives multiple route request (RREP) messages from multiple paths. They chooses best path on basis of lower hop count and set that path as primary path. Rest of the paths is used as secondary paths for backups if primary path breaks. PL_AOMDV protocol find out Link disjoint and Node disjoint path from source to destination. No path or node repeated. They make a loop free path.

Route Maintenance: Route maintainer when route breaks due to congestion less power, RERR (route error) message will be generated from node to the source node. Source node selects another secondary path for packet transmission. They choose best path among all paths and start transmission to that route and the path select a primary path. HELLO messages are flown to use to check the live ability of other routes. When there is no path available from source to destination then route discovery process again start.

6. Clustering of nodes Clustering is an approach used to reduce traffic during the routing process .Clustering is division of the network into different virtual groups based on rules in order to discriminate the nodes allocated to different sub networks. The goal of clustering is to achieve scalability in presence Of large networks and high mobility. Roles of nodes in clusters are grouped in four categories namely cluster-head, gateway nodes, member nodes, and guest nodes.

- Cluster-head: A Cluster-head node is the local coordinator of a cluster. The transmission range of cluster head describes the limitations of a cluster.

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- Gateway Nodes: Gateway nodes are located at the boundary of the cluster. It can forward information between clusters
- Member nodes: Member nodes are also called as ordinary node. Member nodes are members of a cluster and these nodes have neighbors' belonging to their own cluster.
- Guest Node: Guest node is a node associated to a cluster.

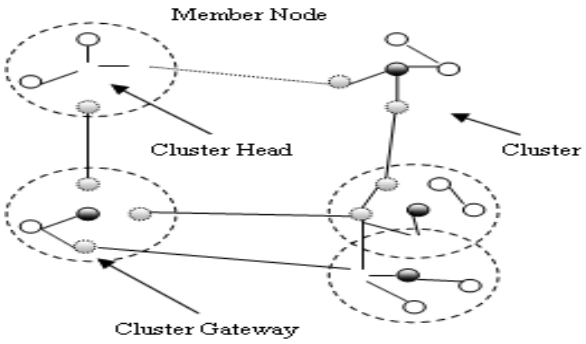

Figure6.Categories of nodes in Cluster

7. Network Architecture

Network Architecture (version 2) is usually known as NS2, it is a powerful simulator for studying dynamic nature of mobile wireless sensor network. NS2 supports Simulation of a network from physical radio transmission channel to the application layer [8]. The NS2.33 is used for simulation and was conducted under the Linux Platform. The network simulator ns-2 is another discrete event simulator targeting at networking research. NS is a discrete event simulator targeted at networking research. Using X-Graph (A plotting program) can create graphical representation of simulation results. All the work is done under Linux Platform; preferably Ubuntu.NS2 is an object oriented simulator, written in C++, with an OTCL interpreter as a frontend.

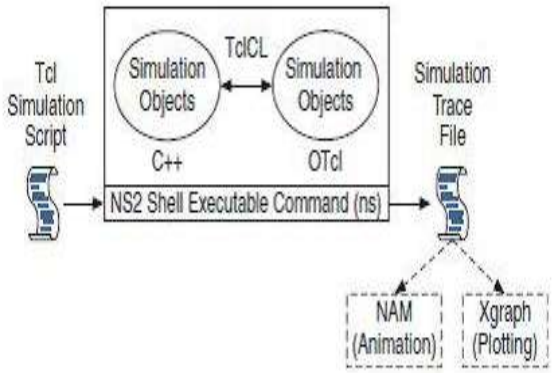

Figure7. Architecture of NS2 [5]

8. Simulation Parameters

Parameters	Values
Simulator	NS2
Existing Protocol	PL_AOMDV
Proposed Protocol	IPL_AOMDV
No of nodes in Scenario1	20
No of nodes in Scenario2	40
No of nodes in Scenario3	50
Simulation Area	800*800
Metrics	Elapsed time (0m/s)
	Elapsed time (2m/s)
	Elapsed time (5m/s)
	Network overhead

Step1: Network deployment: The network is deployment with 20 nodes in the first Scenario. Then network is deployment with 40 nodes in the second Scenario and set number of 50 nodes in the third scenario. The network is deployed at the far Places.

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Figure 8.1. Simulation for Network deployment

2. Cluster formation: The network is divided into fixed size cluster and a node synchronizes its using global positioning system. The clusters are formed in the hexagonal shape because this covers the network more appropriately. There are four clusters every cluster has nodes in the hexagonal shape.

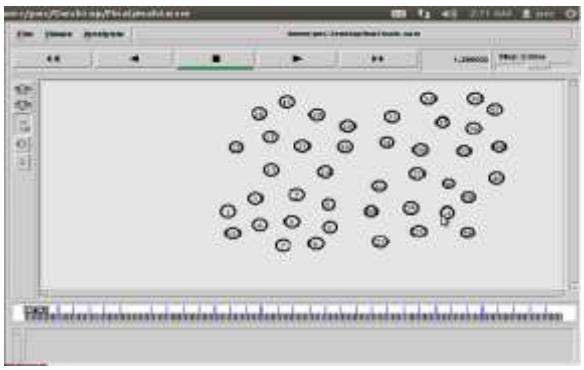

Figure8.2. Simulation for cluster formation

3. Selection for cluster head: Cluster head selection cluster head are divided into each cluster. Each cluster has a many nodes. Each cluster head acts as a temporary base station. In each group, one node is elected to be the cluster-head while the rest of the nodes become ordinary nodes. The cluster size is controlled by the cluster-head's transmission power i.e. its Communication range. The Cluster Head coordinates transmissions within the cluster, handles Inter-cluster traffic and delivers all packets destined to the cluster. Cluster Heads therefore experience high energy consumption and exhaust their energy resources more quickly than ordinary nodes do. Cluster head selection number of mobile nodes is set 50.

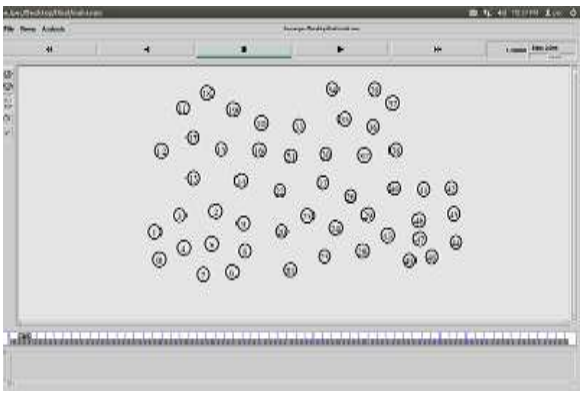

Figure 8.3.Simulation for cluster head formation

4. Sink Deployment: Sink is deployed in the network to get data from every cluster through the cluster heads. The sink is deployed in the network for broadcasting the sensed data to the internet.

5.Cluster Communication: Cluster communication in number of set nodes 50.These node path between sources to destination. Source to destination each node communicate with each another nodes. These cluster head is responsible for delivering the data to the destination. Each node sending a data packet "hello" message to each other. When a mobile node receives a message, it checks to see if the message is meant for it. If the message is intended for it, it then Sends a reply back to the source and if not; it sends the message to other nodes within the network. The node checks the sequence number within the message received and if it is higher than what it has, it automatically increases or updates its own to the current one before either Sending or accepting the message.

6. Network topology of 50 nodes: All nodes have coverage area of 150meters. Node movement is random. We construct a topology of 50 nodes with constant bit rate traffic. Bandwidth of channel is set 2Mbps and 802.11 wireless LAN MAC layer used. It used to check the link breakage of network layer. Congestion based IPL_AOMDV protocol used in topology. The topology of nodes in network.NAM window shows the node in area of 800 X 800.

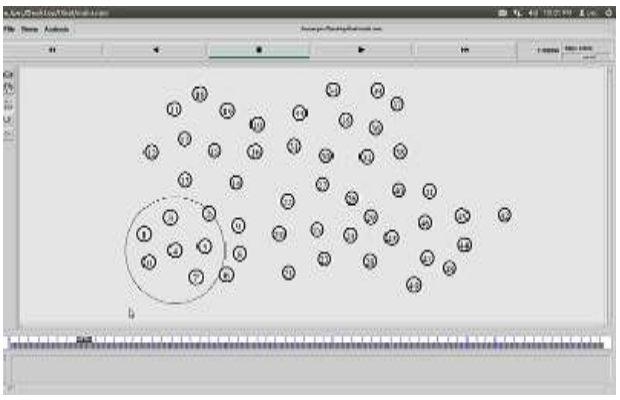

Figure 9.4.Simulation for network topolgy of 50

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Nodes

7. Nodes moves and Transmission range: The number of set nodes is 50.Each node communicate between sources to destination. These nodes in transmission range. Transmission range in 19 nodes. These 19 nodes in the transmission range communicate with each other. During Communication, when node 19 moves from one direction to another, packets are dropped some interval. Topology get effected and the position of nodes changes

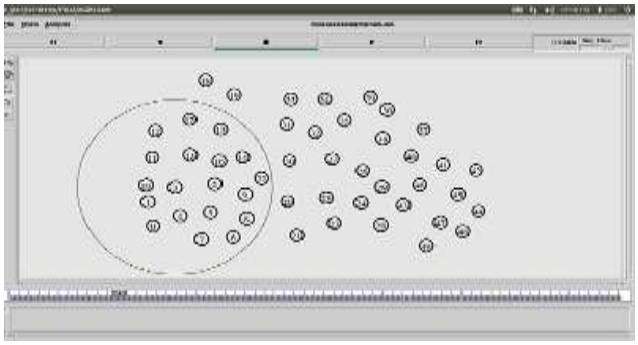

Figure 8.5. Simulation for nodes moves and transmission range

9. Table Results Performance of IPL_AOMDV and PL-AOMDV.

Protocol Parameters	IPL-AOMDV	PL-AOMDV
Elapsed time 0m/s	700	650
Elapsed time 2m/s	680	650
Elapsed time 5m/s	700	650
Network Overhead	330	360
Throughput	700	695
PDR (Packet Delivery ratio	700	690

Figure9. Results Performance of IPL-AOMDV and PL-AOMDV

10. Simulation Results

10. Relationship between PDR (Packet Delivery Ratio) vs Time: It shows the ratio of the number of delivered data packet to the destination as shown in 5.5 This illustrates the level of delivered data to the destination. The proposed scheme improved Power Control Load balancing Multipath Routing gives the proposed protocol gives improvement of 5%. Packet Delivery Ratio (PDR) is the ratio of number of packets received and number of packets sends in network. This performance metrics important to analyze the packet percentage successfully received in network. In this graph the performance of proposed IPL_AOMDV routing protocol is better than the normal PL_AOMDV, AOMDV, AODV routing protocol.

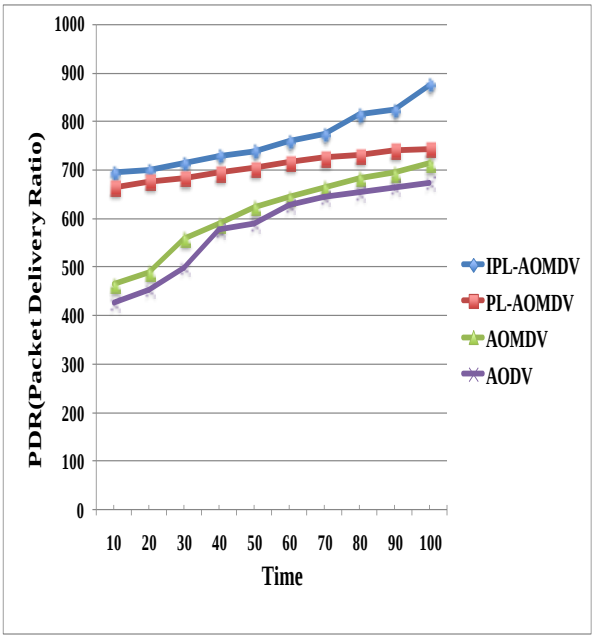

Figure10.Relationship between PDR (Packet Delivery Ratio) vs Time

10.1 Relationship between Throughput vs Time

This graph represents the throughput analysis in case of normal PL_AOMDV, AOMDV, AODV based routing and proposed queue length and rate control based IPL_AOMDV based routing. The throughput has represents the number of packets sends in per unit of time in network. Now if measure the performance of both the protocol then the performance of pro-posed protocol is better than normal multipath routing. Here we observe that in case of normal PL_ AOMDV based routing only nearby 695,AOMDV 400,AODV-395 packets maximum are deliver in network in

per unit of time but in propose scheme maxi-mum more than 700 packets are sends in network in per unit of time. It means that the multipath protocol is able to improve network performance the new technique if included with multipath protocol then the performance of network improves with congestion handling, Power Control and load balancing.

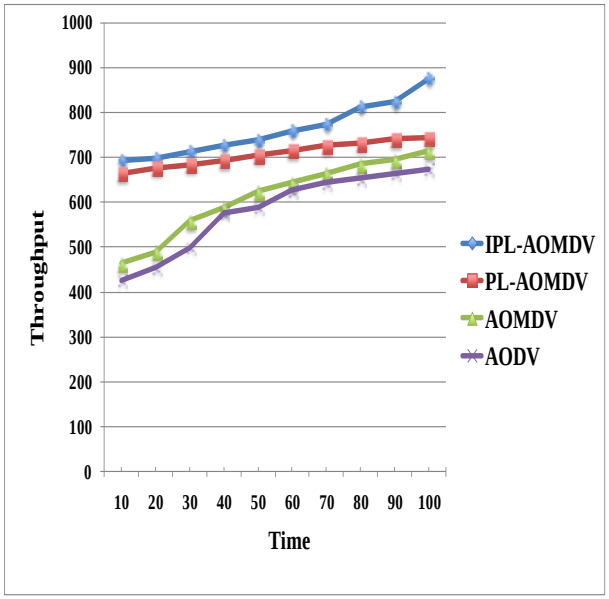

Figure10.1Relationship between Throughput vs Time

11. CONCLUSION

In this paper address the problem of existing multipath routing protocol PL_AOMDV and also discussed the new routing protocol namely IPL_AOMDV, and also compare them in terms of Load balance, congestion control and power control parameter and found that IPL_AOMDV outperform the existing routing protocol in each aspect. All the simulation has been done in NS2 and results proves the effectiveness of IPL_AOMDV. In this Paper also concluded from the outcomes of parameter that IPL_AOMDV is the best Load balancing multipath routing protocol present in the literature.

12. REFERENCES

[1] Amis, Alan D. and Ravi Prakash. "Load-balancing clusters in wireless ad-hoc networks." Application-Specific Systems and Software Engineering Technology, 2000. Proceedings 3rd IEEE Symposium Vol-4 2000.PP:25-32.

[2] Aoudjit, Rachida, et al. "Load balancing: An approach based on clustering in ad hoc networks."*CIT. Journal of Computing and Information Technology* Vol: 17.2 (2009).PP:177-184.

[3] Bawa,Onkar Singh, and Mr.Supratik Banerjee. "Congestion based Route Discovery AOMDV Protocol." *International Journal of Computer Trends and Technology* Vol: 4.1 (2013).PP: 54-58.

[4] BR, Arun Kumar, Lokanatha C. Reddy, and Prakash S. Hiremath. "Performance comparison of wireless mobile ad-hoc network routing protocols."*IJCSNS Vol:* 8.6 (2008). PP: 337-343.

[5] Cho, Hyun Kyung, Eun Seok Kim, and Dae-Wook Kang. "A load-balancing routing considering power conservation in wireless ad hoc networks." Database and Expert Systems Applications, 2005. Proceedings. Sixteenth International Workshop on.IEEE, Vol -4,2005. PP. 128-132.

[6] Devi, P. Rama, and Dr D. Srinivasa Rao. "Congestion Adaptive Hybrid Multi-path Routing Protocol for Load Balancing in Mobile Ad Hoc Networks."*International Journal of Computer Science and Telecommunications* Vol-3.12 (2012): PP: 11-19.

[7] Deshmukh, Sneha R., and Vijay T. Raisinghani. "EALBM: Energy aware load balancing multipath routing protocol for MANETs." *Wireless and Optical Communications Networks (WOCN), 2014 Eleventh International Conference on*.IEEE Vol-5, 2014.PP1- 7.

[8] Gupta, Ruchi, et al. "A Research Paper on Comparison between Energy Efficient Routing Protocol with Energy and Location in MANET." *IOSRJCE* 8727 Vol-9 (2013): PP 70-75.

[9]Gurpreet kaur, Naveen Kumari:"Improved Power Control Load Balancing Multipath routing Protocol for wireless ad-hoc network."IJARCET ,Vol-4,Issue-7,july,(2015):PP 3073-3080.

[10] Goswami, Subhrananda, Subhankar Joardar, and Chandan Bikash Das. "Reactive and Proactive Routing Protocols Performance Metric Comparison in Mobile Ad Hoc Networks NS 2." *International Journal of Advanced Research in Computer and Communication Engineering Vol. 3, Issue 1* (2014). PP: 4908-4914.

[11] Hoebeke, Jeroen, et al. "An overview of mobile ad hoc networks: applications and challenges." *Journal-Communications Network* Vol: 3.3 (2004). PP: 60-66.

[12] Kaur, Gaganpreet, T. Hamsapriya, and Praveen Lalwani. "A new energy efficient queue based multipath load balancing in Ad hoc network." *Computer Communication and Informatics (ICCCI), 2014 International Conference on*. IEEE, Vol-4, 2014. PP.1-6.