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AN ENHANCED POWER COEFFICIENT AND HOP COUNT-AODV ALGORITHM (EPHC – AODV) FOR CONGESTION CONTROL IN MANET

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ABSTRACT

Mobile ad-hoc network is defined as the network in which nodes are communicated with each other without permanent network. Here nodes are itself performing as the router. In nodes are in changeable format that means they change network topologies time to time as they change their position. In congestion is main issue. Congestion means when transmit the number of packets across the network is larger than the capacity of the network then network happen to congested. Due to congestion the packets have to be deleted and also reduce the performance of the set of connections. To finding the congestion free shortest path is a major issue in MANET. The proposed system modifies the existing PH-AODV algorithm. In this system used power coefficient and the hop count parameter to improve the performance of EAODV. And the nodes transmit the packets and waits for acknowledgement for the threshold phase of time. If the acknowledgement not received with in threshold phase then the node broadcast again to select alternate path. Here we analyze the performance of proposed system which is better than existing system by using various performance parameters on different number of nodes namely packet delivery ratio, average end to end delay ratio, packet loss ratio. It is practical that the new protocol is much better than EAODV.

KEYWORDS: MANET, EAODV routing algorithm, EPHC-AODV, Congestion Control, PH-AODV Algorithm.

INTRODUCTION

Mobile Ad hoc Networking (MANET) is a collection of mobile nodes that are connected over various wireless links. There is no any fixed infrastructure. In nodes are freely moves in the network and change topologies every time. In this network nodes are not only behave as the host but also act as a router. In nodes are communicate with each other directly via wireless link if they are in means of communication range. If they are not in range then they depend upon other neighboring nodes which act as a router to transmit the packets. Routing is a problem in MANET due to limited resources and moving character of nodes. To use these limited resources professionally, we required efficient routing strategies which should also be adaptable to changing condition of the network be fond of, size of the network, traffic density and network partitioning.

Nowadays, a lot of applications require high bandwidth for broadcast voice, video, and data, so the need for routing protocols that provide high flow rates and very small transfer delay is essential. In the literatures, there is a wide variety of ad hoc routing protocols: on-demand routing protocols are very popular, they discover and maintain routes only when needed and they reduce routing overhead. AODV routing protocol is probably the most cited routing protocols for MANETs in literature. Recently, there has been substantial work done in the field of developing efficient energy and reliable routing protocols for enhancing the performance in MANETs. A major drawback of the most existing ad hoc routing protocols is that they do use only one metric during route setup. Hence they cannot adapt to the dynamic MANET environment. In this paper, we proposed a new variant of AODV routing protocol, called EPHC-AODV, which combines the power coefficient and the hop count parameter to improve Quality of Service (QoS) in the MANET and to select better routing paths. The proposed system is node energy level is low means to select the alternative path to transmit the packets. And the nodes transmit the packets and waits for acknowledgement for the threshold phase of time. If the acknowledgement not received with in threshold phase then the node again to select alternate path or retransmit the packets. Here we analyze the performance of proposed system which is better than existing system by using various performance parameters are packet delivery ratio, average end to end delay ratio, packet loss ratio. It is practical that the new protocol is much better than EAODV.

OVERVIEW OF PH-AODV

PH-AODV is a distance vector reactive routing protocol that combines the node power level and the hop count parameters to select better routing path. Similar to AODV, When a source node that seeks sending data packets to a target node, PH- AODV checks the source route table for a valid route to the target node, if exists, it forwards the data packets to the next hop along the way to the target. On the other hand, if a valid route is not existing in the route table of the source node, it starts a route discovery process by broadcasting a RREQ (The RREQ contains the internet protocol (IP) addresses of the source and destination nodes, current series number, the last known series number, node power level and hop-count) to its neighbors, Its neighbors forward the RREQ to their neighbors until the RREQ reaches the destination or an intermediate node that has fresh route information. Nodes receiving this packet update their routing table for the source node and set up backwards path to the source node, the route cost is calculated using the following equation:

rout cost=w1*1/hopcount+w2* node-power-level/hop count;

Noting that the weighting parameters, w1 and w2 are set experimentally to 0.5. The recorded information shall be used to construct the reverse path for the route reply packet, if the same route reply packet arrive later on, it is discarded. The destination or intermediate which knows the route to the destination node will send a route reply packet (RREP) to the source node along the path from which the first copy of the RREQ is received, it should be noted that the intermediate node replies to the RREP only if it has a destination sequence number that is greater than or equal to the number contain in the RREP. When the RREP arrives from the destination or the intermediate node, the nodes forward it along with the established reverse path and store the forward route entry in their route table by the use of symmetric links. When receiving a route with a better route cost, the routing table of a node is updated to ensure using the best power_hopcount route for transmitting data packets. If the destination or the intermediate node moves away a route maintenance process is initialized and performed by sending a link failure notification message to each of its upstream neighbors to ensure the deletion of that particular part of the route. Once the link failure detect message reaches source node, it restart a new route discovery process.

RELATED WORK

Heena, Deepak Goyal [4] et al performed a work "CONGESTION CONTROL USING ENHANCE AODV (EAODV) ROUTING MECHANISM IN MANET" The proposed system modifies the existing AODV algorithm by using congestion control phenomena. In this system the node waits for acknowledgement for the threshold period of time. If the acknowledgement not received with in threshold period then the node broadcast again to select alternate path. This paper discusses the congestion control using EAODV. Here we analyze the performance of proposed system which is better than existing system by using various performance parameters on different number of nodes namely packet delivery ratio, end to end delay, packet loss ratio.

Ashraf Abu-Ein, Jihad Nader [2] et al performed a work "An enhanced AODV routing protocol for MANETs" In this paper, a PH-AODV routing protocol is proposed, it is a modified version of AODV. The proposed protocol combines the power coefficient and the hop count parameter to improve the performance of AODV. And it is compared with AODV in terms of throughput, end to end delay and number of drop packets. It is observed that the new protocol is much better than original AODV.

Mr. A. Chandra, Ms. T. Kavitha [5] et al performed a work "Adaptive Virtual Queue with Choke Packets for Congestion Control in MANETs" In this paper we made an effort to present a queue management approach. However the approach has outperformed existing queue management techniques RED and REM. Here choke packet mechanism is used to send the feedback to sender. It involves additional overhead to the traffic. Maintenance of virtual queue consumes additional buffer space.

Md. Manowarul Islam, Md. Abdur Razzaque, Md. Ashraf Uddin, A.K.M Kamrul Islam [7] et al performed a work "MCCM: Multilevel Congestion Avoidance and Control Mechanism for Mobile Ad Hoc Networks" In MANETs, congestion frequently leads to packets loss or delay in packets transmission. Our proposed. MCCM mechanism capable of developing an energy efficient path that ensures maximum use of network resources. The multilevel congestion detection and control mechanism of MCCM improves network performance significantly. The selective data delivery mechanism provides an effective way to mitigate congestion and ensures high data delivery rate, lower end-to-end delay and normalized routing overhead. Thus, MCCM outperforms the state-of- the art protocols and provide high throughput.

Rushdi A. Hamamreh, Mohammed J. Bawatna [6] et al performed a work "Protocol for Dynamic Avoiding End-to-End Congestion in MANETs" This paper presents current research on solving TCP congestion problems over MANET by presenting most used TCP variants that preserve end to end semantic and there analysis to increase performance of TCP over MANET. As in case of mobile networks, performance of TCP degrades because of its inability to handle efficiently packet losses due to congestion. We have placed special emphasis on TCP-WELCOME, because it is the most successful TCP variant over MANET, due to its ability to differentiate between types of packet losses in MANET. This article proposed a new dynamic mechanism to replace traditional congestion algorithm of TCP-New Rushdi A. Hamamreh, Mohammed J. Bawatna [9] et al performed a work "Protocol for Dynamic Avoiding End-to-End Congestion in MANETs" This paper presents current research on solving TCP congestion problems over MANET by presenting most used TCP variants that preserve end to end semantic and there analysis to increase performance of TCP over MANET. As in case of mobile networks, performance of TCP degrades because of its inability to handle efficiently packet losses due to congestion. We have placed special emphasis on TCP-WELCOME, because it is the most successful TCP variant over MANET, due to its ability to differentiate between types of packet losses in MANET. This article proposed a new dynamic mechanism to replace traditional congestion algorithm of TCP-NewReno used in TCP-WELCOME with dynamic minimum congestion path selection through cross layer analysis. With reference to data analysis and the experimental results, it shows that, TCP-DCM handles packet losses problem due to congestion in more efficient way than TCP-WELCOME does. Hence it improves overall throughput and increase TCP performance over MANETReno used in TCP-WELCOME with dynamic minimum congestion path selection through cross layer analysis. With reference to data analysis and the experimental results, it shows that, TCP-DCM handles packet losses problem due to congestion in more efficient way than TCP-WELCOME does. Hence it improves overall throughput and increase TCP performance over MANET

M. Sanabani, R. Alsaqour and S. Kurkushi [9] et al performed a work "A REVERSE AND ENHANCED AODV ROUTING PROTOCOL FOR MANETS" We conducted extensive simulation study to evaluate the performance of EN-RAODV and compared it with that of RAODV and AODV using NS-2. The results show that EN-RAODV improves the performance of RAODV in most metrics, as the packet delivery ratio, average delay, average throughput, routing packet sent and routing overhead.

PROPOSED WORK (EPHC-AODV)

In the existing work there is no threshold period of time to handle the congestion efficiently. The proposed systems modify or enhance the existing PH-AODV algorithm. In our system the node transmit the packets and waits for acknowledgement for the threshold phase of time. If the acknowledgement not received with in threshold phase then the node broadcast again to select alternate path. Due to this threshold phase of time our proposed system detects and control congestion very fast than existing system. Because in existing system thus not use power coefficient and hop count ,hence existing system detects congestion late than proposed system , that's why existing system do not control the congestion very efficiently than proposed system. This shows more packet loss in existing system than our system. So, our system does work more efficiently to control the congestion at high traffic than existing system. The procedure can be understood by following algorithm:

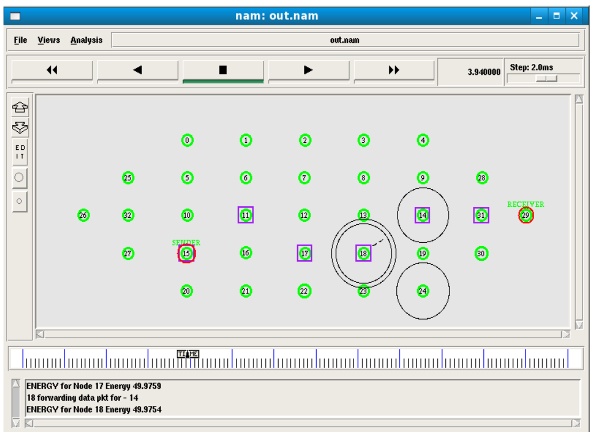
Step 1. Select source and destination node.
Step 2. Selected_node = source
Step 3. While (Selected node! = destination)
Step 4. Broadcast from Selected_node
Step 5. Select intermediate node by using PH-AODV.
Step 6. Send acknowledgement from intermediate node to current node.
Step 7. If delay of Ack > threshold
{
Go to step 4.
}
Else
{
Update current node = Intermediate node.
}

Step 8. End while.
Here threshold is the average threshold time of the network. It varies from one network to another network. In our scenario value of threshold is the acknowledgement time of all the packets transmission.

SIMULATION RESULTS

The proposed EPHC-AODV routing protocol is simulated using NS2 simulator and compared to EAODV routing algorithm. The aim of these simulation runs is to analyze the performance of the proposed EPHC-AODV protocol and to compare its performance with the EAODV. Performance is compared in terms of average throughput, average delay and average drop packets. Average dropped packets is the ratio for the packets not delivered to destination node, throughputs is defined as the ratio of number of packets received to that of the number of packets sent and the end to end delay is the overall average delay experienced by a packet from the source to that of the destination.
There are 40 nodes placed randomly in the simulation environment use. Due to random dynamic topology, the source and destination are also selected randomly.

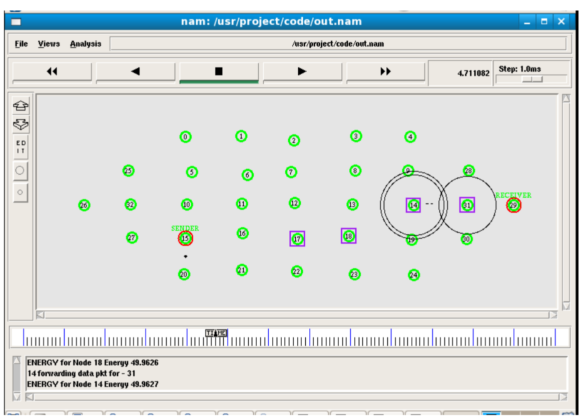
Figure: **1**



PACKETS TRANSMISSION

This figure 1 shows the transmission of packets using selected path and it shows the random network topologies.

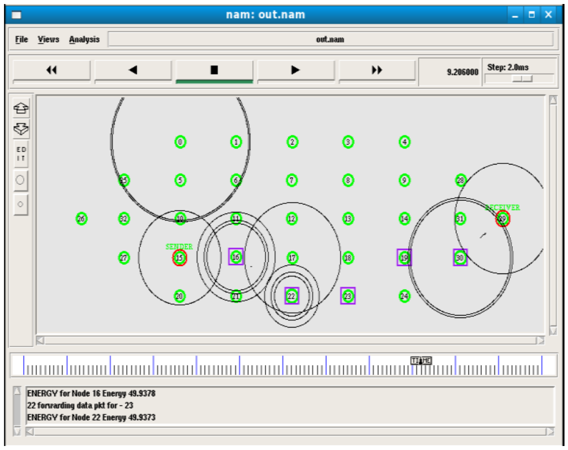
Figure: **2**



PACKET LOSS

This figure 2 depicts when the node energy level is low and after transmission of packets node wait for acknowledgement for the threshold phase of time. If packets not received acknowledgement with in threshold time that the time congestion is occurs in the transmission and the loss is start. The node transmit packets and waits for acknowledgement for the threshold period of time. If the acknowledgement not received with in threshold period then the node broadcast again to select alternate path or retransmit the packets and the node energy level is low means to select the another path. Due to this threshold period of time our proposed system detects and control congestion very fast than existing system.

Figure: 3



PACKETS RETRANSMIT WITH ALTERNATE PATH

This figure 3 depicts the node power level is decrease and if packets not received acknowledgement with in threshold time then nodes select alternate path for retransmit packets. And therefore, the packet loss is decreases due to it detect congestion fast and packets retransmit through new path every time. When the congestion is occurs and decrease the node energy level. So, in our proposed system is reduced amount of congestion.

In this section we are viewing results of our proposed system and existing system by using some different performance parameters.

Various parameters used for analysis are described below:

Formulae:
Packet Loss Ratio (PLR): It is the ratio of difference between the total number of generated packets and total number of received packets divided by the total number of generated packets.

PLR= (Generated packets- Received Packets)/ Generated packets (1)

Packet Delivery Ratio: Packet delivery Fraction (PDF): It is the ratio of the amount of data packets delivered to the destination and total number of data packets sent by source.

PDF= (Received Packets / Packets Sent)*100 (2)

Average End to End Delay: The interval time between sending by the source node and receiving by the destination node, which includes the processing time and queuing time.

$$EED = \frac{\text{(Time packet received-Time packet sent)}}{\text{Total no. of packets received}} \quad (3)$$

TABLES:

Table 1. Table showing performance analysis of existing system (EAODV)

No. of nodes	Generated packets	Received packets	Packet delivery ratio	Packet loss ratio	Average end to end delay
10	17477	5820	33.3009	0.666991	16.5604
20	23588	8915	37.7946	0.622054	14.4912
30	18681	9177	49.1248	0.508752	14.4734
40	18396	8918	48.4779	0.515221	13.7088

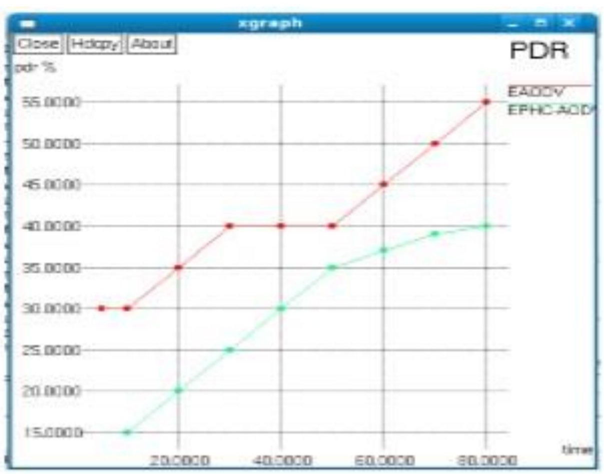
Table 2. Table showing performance analysis of proposed system (EPHC-AODV)

No. of Nodes	Generated packets	Received packets	Packet delivery ratio	Packet loss ratio	Average end to end delay
10	1644	1634	99.3917	0.0060	1.6572
20	1392	1372	98.5632	0.0143	2.6635
30	873	863	98.8545	0.0115	2.2003
40	954	944	98.9517	0.0105	4.8575

This table shows the performance analysis of Enhanced Power Coefficient and Hop Count-AODV Algorithm (EPHC – AODV) system on different quantity of nodes. This table depicts that value of all performance parameters shows changeable behavior with the increases number of nodes except packet delivery, average end- to- end delay. And packet loss is decreases with the quantity of nodes.

In this section we also show the comparison analysis between existing and proposed system through graphs using different parameters on different quantity of nodes. And these graphs shows results or performance of our proposed system are better than existing system.

Figure: **4**



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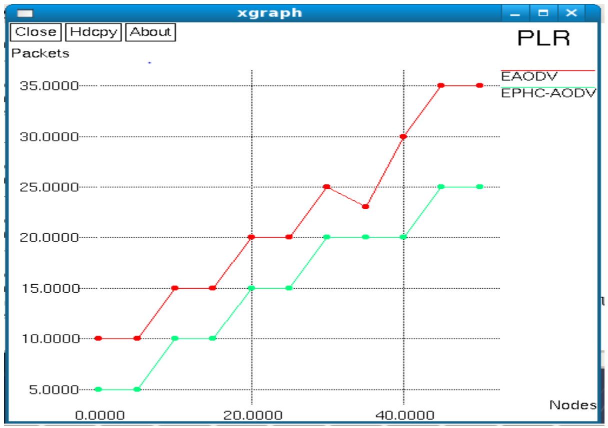
COMPARISON OF PACKETS DELIVERY RATIO IN PROPOSED SYSTEM AND EXISTING SYSTEM

The Figure 4 depicts comparison of Packet delivery ratio. The proposed work is to increase the Packet delivery ratio. The nodes are waiting for acknowledgement in threshold phase of time .If the Acknowledgement not received with in threshold phase means congestion is occurs so to select the alternative path or retransmit the packets and when the node energy is low to select the different path. Because the node energy is very important in packet transmission. When the node energy level is low the node doesn't transfer the packet. While in existing system are not use power coefficient and the hop to find the node energy level in the packet transmission. So the existing system detects the congestion very slow. This show our system is more efficient to control congestion than existing system.

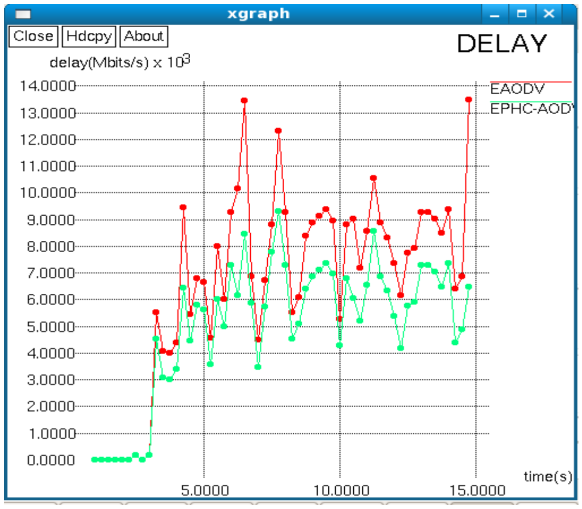
Figure: 5



COMPARISON OF PACKETS LOSS RATIO IN PROPOSED SYSTEM AND EXISTING SYSTEM

Figure 5 depicts comparison of Packet loss ratio. The Packet loss ratio is decreases in our proposed work. The nodes are waiting for acknowledgement for threshold period of time if the Acknowledgement not received with in threshold period which shows congestion so to control congestion the node broadcast again to select alternate path or retransmit the packets. So it detects congestion fast and control congestion effectively when the node energy is decrease to select the different path. Many packets are loss in waiting for acknowledgement long time and when the node energy level is low to increase packets loss. While in existing system are not use power coefficient and the hop to find the node energy level in the packet transmission. So existing system is detects and control the traffic very slow. This shows our system is more effective to control congestion than existing system.

Figure: 6



COMPARISON OF AVERAGE END TO END DELAY IN PROPOSED SYSTEM AND EXISTING SYSTEM

Figure 6 depicts comparison of average end to end delay. In our proposed work is to decrease the average end to end delay. Because in this network nodes are wait for acknowledgement for threshold phase of time, if the Acknowledgement not received with in threshold period that the time congestion is occur. To control the congestion means the node again to select alternate path or retransmit the packets . And when the node energy is low to select the different path. Because the node energy is very important in packet transmission. When the node energy level is low the node doesn't transfer the packet. So it detects congestion fast and control congestion effectively. While in existing system are not use power coefficient and the hop count to find the node energy level in the packet transmission. So existing system is detects and control the congestion very slow. This shows our system is more effective to control congestion than existing system.

CONCLUSION

In this paper, an EPHC-AODV routing protocol is proposed, it is a modified version of PH-AODV. The proposed protocol combines the power coefficient and the hop count parameter to improve the performance of EAODV. And the node transmits packets and waits for acknowledgement for the threshold phase of time. If the acknowledgement not received with in threshold period then the node broadcast again to select alternate path or retransmit the packets. Due to this threshold period of time our proposed system detects and control congestion very fast than existing system. It is compared with EAODV in terms of packet delivery, end to end delay and number of drop packets. It is observed that the new protocol is much better than EAODV.

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