International
Journal
Of Advanced Research in Engineering & Management (IJAREM)
ISSN: 2456-2033 || PP. 18-24

Improving the Quality of Service based on Reactive Congestion Control Protocol for Multipath Routing in MANETS

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1 .INTRODUCTION

Ad-hoc wireless networks are comparatively new paradigm in multi-hop wireless networking that is increasingly becoming popular and will become an essential part of the computing environment, consisting of infra-structured and infrastructure-less mobile networks. Mobile ad hoc network (MANET) is an infrastructure-less multi-hop network where each node communicates with other nodes directly or indirectly through intermediate nodes. The credit for growth of ad-hoc network goes to its self organizing and self configuring properties. All nodes in a MANET basically function as mobile routers participating in some routing protocol required for deciding and maintaining the routes.

Application:

Tactical networks: military communication-military signals involve all aspects of communications or conveyance of information by armed forces. Automated Battle field-A graphic look at future war possibilities, including concise descriptions of advanced weapons systems and providing practical solutions for moving away from nuclear deterrence.

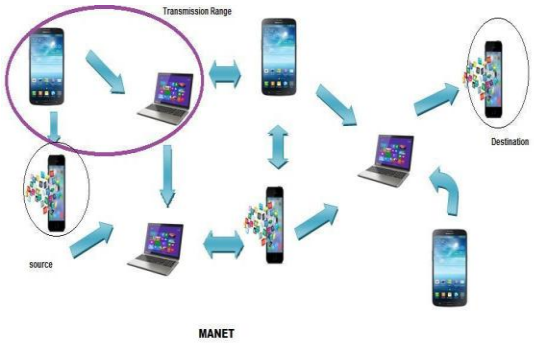

Fig 1: Mobile Ad-hoc Network

Emergency services: Search and rescue operation-automatic location determination, ability to work in a stand-alone mode. Disaster recovery-Earthquakes and hurricanes Educational: virtual classrooms or conference rooms-a teacher may establish a virtual classroom from their residence, students located around 1Km taking the opportunity to form an ad hoc group to improve the teaching learning process at any time .Home and Entertainment: Home/office wireless networking- . Home and office networking concept involves the use of wireless sensors/Wi-Fi routers around the house to control and detect signals in the home-setting, personal area network- A personal area network (PAN) is a computer network used for data transmission amongst devices such as computers, telephones, tablets and personal digital assistants, multiuser games, outdoor internet access .Challenges in MANETS: Infrastructure less- bring new network design challenges, Dynamically challenging topologies- cause route changes, frequent network partitions and packet loss. Physical layer limitations- limited wireless ranges, packet loss during transmission, broadcast nature of the communication. Limitations of mobile nodes- short battery life, limited capacities. Network security.

II. RELATED SURVEY

Afreen Begum Sana et al.[1] – QOS Routing for multipath in MANETS. They attempt to have modified AOMDV RREQ Packet with energy and delay parameters .They considered every node in a network to maintain a table entry of Energy Reduction Rate(err).they also consider another value which is called as threshold TERR value whenever err value is greater than TERR value for a particular node in a network than that node should be avoided in route discovery phase .But in this approach much overhead of maintaining the route table which acts as backup is observed.

They also considered the extra field in AMODV RREQ packet which is called as DEDR(delay energy drain rate) this extra field also increased the processing overhead. Moreover nodes often change their location within network. So, some stale routes are generated in the routing table which leads to unnecessary routing overhead.

Abhinav Vidwans , Ajit Kumar Shrivastava, et al.[2].They tried to improve the performance of AMODV protocol in QOS by using queue length of AOMDV protocol and called this model as Enhanced AOMDV(EAOMDV).They achieve easy implementation of real manets. But the model is not efficiently implemented and it can be extended by synchronization to the node and communication between them.

Meena Rao, et al.[7] They aim is to provide n backup to the AODV routing protocol that means source node have more than one routes .so that in case of failure of link the source can used other provided routes for packet transmission .

When node failure occurs due to an attack or resource failure they considered the energy of the node they have calculated average distance between source and destination and delays of each node in network using distance vector.

Thomas Chowdhry et al.[11].They find the multiple node disjoint path in AODV.

They used initiates route request in route discovery phase .Neighbour nodes of destination allow two duplicate messages .Receiving node generates ROUTE REPLY(RREP) for each secondary source if and only Iff secondary source nodes are different the secondary source maintains multiple route replies .if the link failure occurs this secondary source node send RERR packet to the source node in the network and then the source node can select the alternative route for transmission from its entry table .In short this approach says that intermediate nodes can be used to notify the source node by adding next hop and hop count .however this network model increases usage of memory because another path have to be stored in the memory.

V.P. Patil et al..[9]They tried to increase the performance of network of AODV when mobility of nodes frequent link failure is in the network .They carried out this project by taking packet delivery ratio and average end-to-end delay parameter of quality of service but this cannot be achieved because AODV cannot switch to the other shortest path during expire time because it has to maintained the existing shortest path till the disconnecting of nodes.

III.PROPOSED SYSTEM

3.1 Reactive Congestion Aware Multipath Routing Protocol (RCRP):

In our approach we have modified AOMDV RREQ packet with delay and energy parameters in order to establish less delay path to avoid congestion. Every node in a network has to proactively maintain a table with an entry of Energy reduction rate (ERR). We deem the threshold value of TERR whenever a node value of ERR reach to greater than TERR then we are avoiding that node to be participating during route discovery phase. Every RREQ packet contain a extra field known as DEDR (delay energy drain rate) compare to AOMDV RREQ packet this DEDR field contain two subfields called as ERR and Pd**t** Before broadcasting the RREQ packet from the source, the value of D.E.D.R is _0'. This value gets incremented as it proceeds through the intermediate nodes, till it reaches the destination. The destination will take the decision of route basing on the value of DEDR with the RREQ packet as in AOMDV protocol. The packets which contain less DEDR d will act as a Primary Path. The RREQ packet with more DEDR value will be acting as Secondary Path.

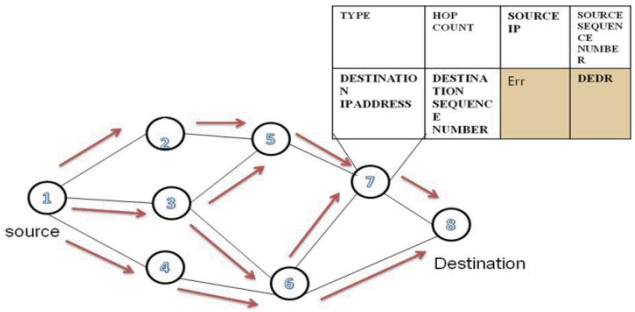

Fig 2: A Nodes Routing Table.

3.2 Avoiding Congestion:

If number of nodes trying to send the information through same node than that node become bottle neck

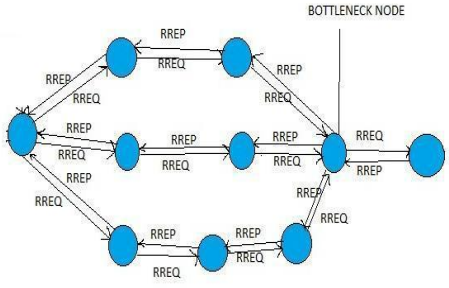

Fig 3: .Showing bottleneck node

In our protocol we are avoiding the congestion using ERR (energy reduction rate) if value of node reach above the TERR value then we are avoiding the node being participating in routing process. whenever node become bottle neck the node automatically reach above TERR value.

3.3 Extending The Life Time Of Network:

The network life time considered as a time that first node failure occurs in network due to lack of battery power. It is important property as impact of first node failure occur on other nodes property. In AOMDV routing selection based on hop count but not energy there may be chance of less network lifetime. we are improving life time by avoiding the node which reach minimum current energy(C.E) as follows.

1. Calculating ERR (energy reduction rate)
2. Calculating PDT (packet delivery time),
3. Based on ERR and PDT calculation of DEDR (Delay energy drain rate)
4. Routing selection based on less DEDR.

3.4 Processing Logic:

The existing AOMDV protocol is modified with features such as energy, delay. In the proposed protocol, the energy drain rate of intermediate node and end to end delay are used as key resource to decide the optimistic path, aims to avoid congestion and increase the life time of network. MANETs act as a peer to peer network, route from source to destination may have number of intermediate node and each node constitutes energy, and each packet needs to encounter with queue delay, processing delay, a propagation delay that whole constitutes the nodal delays. Destination node in a routing path will calculates the packet delivery time by using Packet delivery time is effected by node properties such as energy, Processing time, processing capacity and buffer space of each intermediate node of routing path of nodes and complexity of routing algorithm which include making routing tables Where, PDT=packet delivery time Li=link at i=(1,2,3…n) t=time pi=process time at i(1,2,3..n-2). and taking routing decision. Each node in a routing path will maintain the energy reduction rate of its self as shown in equation (1)

$$ERR=\frac{C.E(X)}{E.C(X(\Delta(t))s}\ldots..(1)$$

Where C.E=current energy of node E.C=energy consumption of node
NOTATION USED:

DESCRIPTION	NOTATION
Delay of node X	$\nabla(X)$
Energy of node	E
Current energy of node x	C.E(x)
Energy reduction rate	E_{RR}
Packet delivery time	P_{dt}
Delay energy drain rate	D.E.D.R
Link at time i(1,2,…..)	L_i
Process time at time i(1,2,…n)	Pi(t)
Reactive congestion aware multipath routing protocol	RCRP

Table 1.Notations used in work

Processing Steps for Energy Reduction Rate:
1. Source node starts sending the RREQ packet in order to establish the route.
2. Every node has to proactively maintain the table with an entry of ERR and DEDR.
3. Source node maintain some threshold value of energy if the value is greater than TERR of particular node then that node will not be participate in routing .
4. Before broadcasting the RREQ packet from the source the value of DEDR is _0'this value gets incremented as they proceed through intermediately nodes till reach the destination.
5. The destination node will select the route based on less DEDR value and make it as primary path.
6. If route contain _n'nodes, there will be (n-1) links
a. Packet delivery time=packet processing delay due to (n-1) links + packet process time in(n-2) links .
7. The ERR is get calculated by using equation 1.
8. The destination node will send the RREP packet on the route which is having less DEDR value.
9. The route which is having slightly greater than DEDR value will act as secondary path.

IV. RESULTS:

The performance of our proposed RCRP protocol using ns2 can be shown by the following which are drawn between number of nodes, throughput, packet loss, packet Delivery ratio overhead, delay parameters of QOS.

The below graph is drawn between Number of nodes on X-axis and throughput in kbps on Y-axis. From this graph we observe that as no. of nodes increases throughput decreases .Here we calculate throughput by a formula

$$\text{Throughput (T)} = \frac{Total \quad Recieved \quad packet}{Time}$$

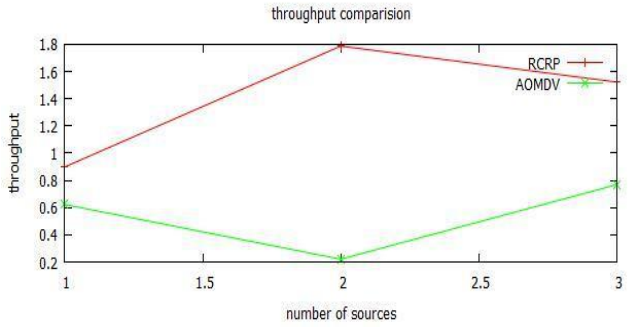

Fig 4: comparisons between the throughput of AOMDV and RCRP

The below graph is drawn between Number of nodes on X-axis and packet loss on Y-axis .from this graph we observe that as no. of nodes increases packet loss is also increases. Here we calculate packet loss by a formula.

Packet Loss (PL) = Send packets – Receive packets

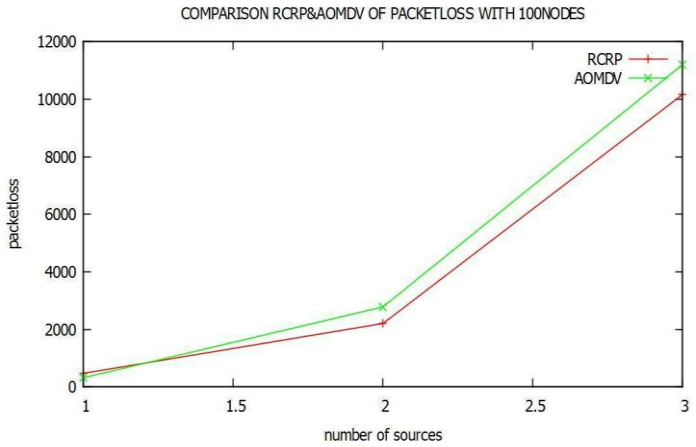

Fig 5: comparison between packet loss of AOMDV and RCRP

The above graph is drawn between Number of nodes on X-axis and delay in seconds on Y-axis from this graph we observe that as no. of nodes increases delay is also increases .Here we calculate delay by a formula.

$$\text{Delay (D)} = \frac{Totaltime}{numbero \quad fpacketsreceived}$$

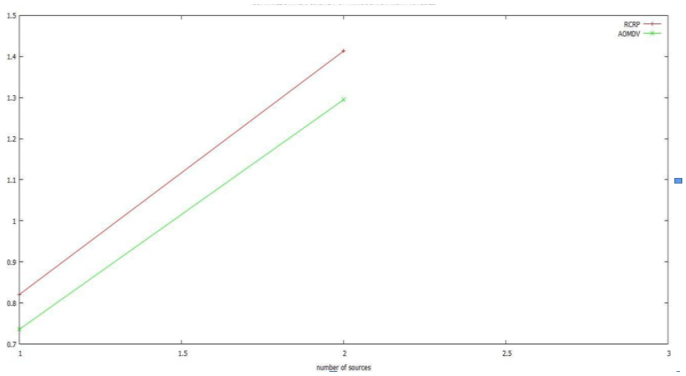

Fig 6: Comparison between delay of AOMDV and RCRP

V. CONCLUSION:

According to our literature survey and simulation work we conclude that delay and energy are important parameter for MANET applications. As MANETS is implemented in remote area where there is a lack of sufficient resources e.g. Military area. When there is a need of voice application which is required minimum mouth to ear delay in order to achieve above two specific parameters (delay and energy) to optimize, we are going to use Multi Objective Optimization Technique in future.

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