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A Survey On Mobility and QoS related routing protocols in Mobile ad hoc Networks

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Abstract: Mobile ad hoc network (MANET) is not only wireless but also infrastructure less networks.In MANET data routed through the nodes. Each intermediate node acts as a router Therefore,It is difficult to predict the future location or network topology of nodes. In anycast routing multiple instances share the same IP address.From multiple instances,packet routed to the nearest instance. Anycast communication is simple.It has minimum communication overhead because packet sent to the nearest neighbour,therefore,it saves power,network bandwidth and message collision during message transmission.Due to host movement and changes in network topology stability and QoS of nodes is an important issue in MANET.Many routing protocols have been proposed for stability and improving QoS of nodes.This paper presents some of the latest mobility and QoS-aware routing protocols in MANET which gives adaptability,reliable and efficient routes and also takes care of QoS parameter of a network.

Keywords: *Anycast routing,MANET,Mobility,QoS*

I INTRODUCTION

Wireless is one of the emerging technology in which user can access services or information without any geographic position.Due to the IP network access to the internet through wirless communication has become important.Mobility sup-port in internet protocol reduces power consumption,reuse of resources.Nowadays people can use internet with smart-phones,laptops,PDA,palmtop anytime and anywhere in the world.Therefore,wireless network perform important role in networking.Generally,Wireless network can be grouped into two categories:infrastructure network and infrastructureless network.Infrastructureless network is nothing but ad hoc net-work.Mobile ad hoc network is one of the sort of ad hoc network in which each node can move independently without any centralized control. Each node performing the role of a router. Each node in MANET is mobile.In MANET,different nodes are propagated over geographical area that dynamically changes their position.Due to this nodes mobility,changes in network topology occurs frequently.MANET requires con-fined energy and computing resources.MANETs are appli-cable in various fields such as military application,disaster battlefield.Thus routing protocol plays an important role in such environment.Routing protocols in MANET were de-veloped for minimal control overhead,minimum processing overhead,dynamic changing topology maintenance.Ad hoc net-works classified as proactive and reactive.Proactive routing protocol consists of routing table.If there is change in network topology,then message broadcasted by each node related to the changed network topology.To maintain up-to-date routing information tables are updated regularly.Link state routing protocol,optimized link state routing protocol are the examples of the proactive routing.Reactive routing protocol has lower overhead beacause route determination is on demand.It has no overhead of updating routing table.Reactive protocol find out route on demand.Then sends the packet over that route.It mini-mize the cost of maintaining routes.dynamic source routing,on-demand distance vector routing are the reactive routing proto-cols.Anycast routing is one to one of many association.When mobility of nodes and link breakage are frequent then anycast is important way communication.Anycast allows sender to transmit packet to single destination out of set of destina-tion.Client send packet to one of nearest destination.Anycast network service select one of the best one service from an group of service as a

destination.To manage mobility of nodes and managing dynamically changing network topology is an important issue in MANET.

A. Anycast Routing

An anycast address has multilple destinations.The anycast routing protocol has responsibility to maintaining and for-warding datapackets with its anycast address to its intended destination.Anycast techonology provides major improvements in mobile network architecture.There are major issues exists to managing mobile nodes under dynamically changing topol-ogy.Anycast routing provides robust environment under such dynamically changing topology condition.

B. Mobility

Mobility of nodes dissembles the number of connected paths which affects the routing performance.Mobility model affect the route lifetime and reliable link.There are different mobility models:

1)Random way point model: Random waypoint model was first developed by Johnson and Matz. It is standard for measuring MANET routing protocols.Setdest tool may be used to generate node trace in random way point model.It consists of a series of trips.Initially each mobile node assign to uniform location at time zero.At beginning mo-bile select random destination.Then It travel to the newly selected destination.After arriving at a destination mobile pause foe some time period.If time period expires,it starts traveling again.
2)Random walk model:In this model,each node have to travel a random destination from its current location with its random speed.
3)Gauss-Markov Model: According to guassian distribu-tion,this model uses former speed,former direction and random variables to calculates its current speed and direction.

C. Mobility related problems

Nodes in manet are free to move independently anywhere in network.This mobility of nodes causes certain issues in network.Mobility of nodes breaks the path.This continuously path breaking situation affets the QoS parameters in the network. Fig.shows effect of node mobility on path.If node A to D are in transmission scope of each other and if node D moves from its current position to new position D1,then link C > D will be broken.Due to this pathfromA > D also broken.

II LITERATURE SURVERY

There are several mobility aware routing protocol have been developed by different authors to find stable routes,reliable link including QoS parameters.P.I. Basarkod et al.(2015) and S.S. Manvi et al.(2015) have proposed mobility and QoS aware anycast routing protocol[1] in MANET.This protocol has three model for mobility of nodes and to improve QoS of network.These models are Stability model,link expiration model,congestion model.These models based on anycast rout-ing in which it select nerest server among multiple servers.This selected server must have less stability,less congestion and minimum route expiration time.This MQAR works better in high mobility and dynamic environment.Therefore these three models select stabilize,non congested node,less route expira-tion time node to transmission of packets.

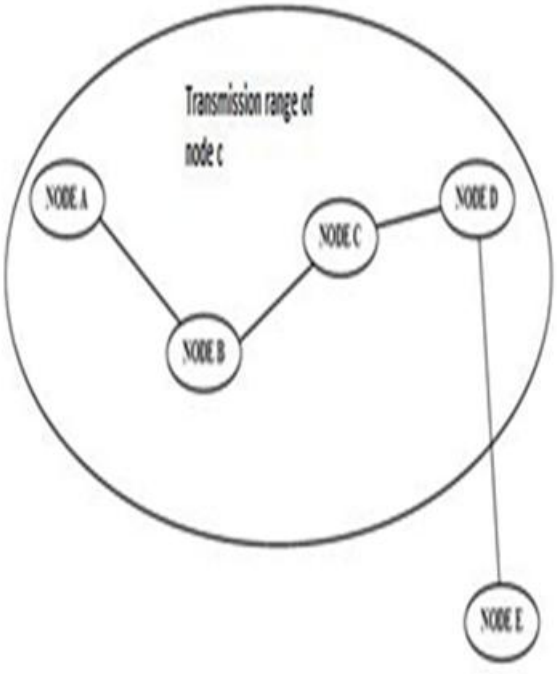

Figure 1 All nodes are in transmission range of node C except node E

MQAR protocol is not efficient in high throughput envi-ronment e.g. in multimedia applications by using negotiation parameters in request packets for finding nearest server using non-congested path. Ajay Kumar Yadav et al.(2016) proposed QMRPRNS[2] protocol which is the QoS related multicast routing protocol by using reliable node selection scheme for MANETs.This protocol finds multiple reliable paths to des-tination.When source wants to send packet to

multiple receiv-ing nodes,multicast route created which consists of reliable neighbour nodes.

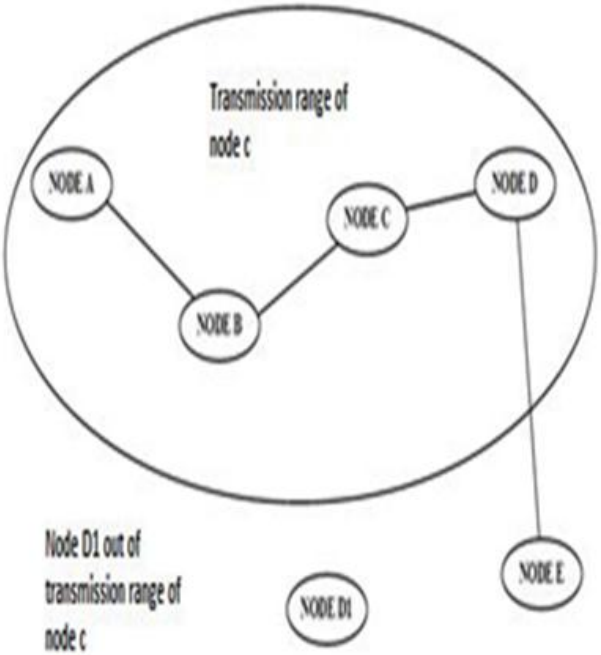

Figure 2 Node D1 out of transmission range of node c

Reliability pair factor is used to find reliable neighbour.It computes reliability pair factor and omit nodes which has less reliability by compairing reliability factor with threshold reliability value.Then by using route request(RQ)and route reply(RP)packet it finds multicast routes.Based on max-imum reliability value multicast route has been assigned.Each node consists of two tables: Multicast Route Information Ta-ble(MRIT) and Neighbouring Information Table(NI) to guide each node to transfer each packet from source to multiple destination.

In this protocol there is overhead of table maintainance and periodically updation of tables.

Gurav Singal et al.(2016) proposed Moralism multicast routing protocol[3]. Author used node mobility to measure their movement in the network. Link which has long routing life considered as stable link.Signal strength variation is used to identify direction of the node.The proposed convention does not decide hubs correct posi-tion utilizing any settled infrastructure.They select dependable connection from existing gathering of asking for link.Therefore there is an odds of connection disappointment.Fraser Cadger et al.(2015) have proposed location and mobility aware routing protocol[4] i.e. Geographical predictive routing protocol.This protocol uses Artificial Neural Network to take mobility aware decisions and location prediction. GPR uses NN algorithm to predict neighbour locations using its previous coordinates with their time period.At the time of packet forwarding each neighbour with their two previous coordinates and their timestamp passed with their current timestamp to NN algorithm.GPR then evaluate the coordinates which is compared to nodes own transmission scope.If nodes are outside transmission scope then neighbour will not a next hop.

NN algorithm unable to predict change in mobil-ity.Sometimes it is possible that neighbour may have died or neighbour table entry is irrelevent.This is one of the limitation of GPR protocol.

Mawloud Omar et al.(2015)proposed On-demand source routing with reduced packets protocol(DS2R2P)[5].It operates in two steps route discovery and data packet routing.The proposed protocol has cache which maintain route track of the node.This cache consists of two fields index and the sub-route.When source node wants to send data packet to densti-nation node,it first checks the cache weather the route already stored in cache.On otherside node broadcast RREQ(Route Request) packet in a network for collecting available route information.After receiving RREQ each node with its own address forward to the neighbour node.This process continue until RREQ reaches to its inded destination.

DS2R2P protocol has overhead of maintaining RREQ,RREP packets of transmission.Periodic updation of packets header is necessary.This is one of the limitation of these protocol.

Mamatha Balchandra et al.(2014)proposed Multiconstrained and multipath QoS aware routing protocol[6].In this protocol QoS parameters takes into account for achieving reliable link,energy efficient paths.It is node disjoint roting proto-col.Routing decisions based on three constraints i.e. De-lay,Route Life Time and Energy.Path calculation based on these constraints.The path which satisfy these requirements will be select and stored in routing table.If failure of any nodes occurs between routing then remaining paths can be utilized for routing.Each RREQ(Route Request)packet which is broadcasted over network has timestamp associated with it which avoid unnecessary loss of packets.

In Multiconstrained and multipath QoS aware routing proto-col consists of the RREQ(Route Request),RREP(Route Reply) packets.Due to this packets there is a chances of unnecessary flooding of packets in a network.

Ali Moussaoui et al. (2013) have proposed a link-state QoS routing protocol[7] based on link stability for MANET.This protocol uses stability function to calculate mobility degree of a node.This mechanism utilized with Optimized Link State Routing Protocol(OLSR) to select stable and multipoint re-lay nodes.It also gives assured QoS i.e packet loss,responsetime.The proposed method based on two concepts:Stability and Fidelity of Nodes(SND and FND).This SND and FND used to improve this algorithm which gives stability degree of given MPR nodes.This SND

and FND integrated in OLSR protocol.Author used MPR to reduce commutation of control messages between this MPR nodes.Thus author proposed a new protocol i.e.STOLSR (standard OLSR)to select MPR nodes to achieve degree of reachability.So,this protocol at-tempts to reduce flooding in a network.

Link stability in this protocol is not a unique parameter to calculate durability and availability of the path.This protocol does not works better if path overload occur.It does not calculate remaining energy of nodes in the path.

Budyal et al.(2013)proposed ANFIS and agent based band-width and delay aware anycast routing[8].Author proposed Adaptive Neuro-Fuzzy Interference System(ANFIS) based on QoS constrained anycast routing by using three mo-bile agents. Static anycast manager agent(AMA), static op-timization agent(OA), and mobile anycast route creation agent(ARCA).These mobile agents find multiple paths from client to server.It computes QoS factor of each path by using mobility.

This proposed protocol consider less QoS contraints i.e re-sults in poor quality of service.It's performance degrades at the time of multiple anycast route for different QoS requirements.

In Yaser Khamayseh et al.(2011)author proposed Mobility and load aware routing protocol[9] for MANET.Proposed protocol used to controls the flooding in a network by avoid-ing paas around the message on slow speed and low loded nodes.Each node takes the forwarding decision based on speed and routing load of a network.MLR uses the markovian decision process tool.MLR used to find stable routes with a long lifetime of a link.It allows intermediate nodes to decide weather to forward or drop RREQ(Route Request)packets based on route speed and load.MDP tool used to take such decision which improves network performance.MLR tries to minimize broadcast strom problem which commonly occurs in ad hoc networks.

Mobility and load aware protocol uses markovian decision process tool which does not considering link quality,remaining power capacity,node's density and traffic type while making routing decision.This is one of the drawback of this protocol.

Senthil Kumaran et al.(2011)proposed EDAPR(Early con-gestion detection and adptive routing)[10].EDAPR constructs non congested nodes list and find path towards destination through non congested nodes.It minimize network congestion and find non-congested path.EDAPR is unicast routing proto-col.When source wants to send packet to destination ,EDAPR constructs non congested neighbours set.By using this set source find non congested path to destination .EDAPR reduces the overhead of finding non congested path and packet flooding problem.

Early congestion detection and adaptive routing works with fewer packet loss.Therefore it is not suitable in case of high packet losses.Packet delivery ratio is less as compared to other techniques.

Natarajan Meghanathan et al.(2011)proposed location pre-diction based routing (LPBR) protocol[11] with multipath and multicast routing.This protocol gather all information re-lated to the mobility and location of nodes in network and store all gathered information at final destination.With the help of this collected information destination node predicts the global topology.This protocol lowers the flooding based route.Author used two protocols:1.NR-MLPBR (non-receiver-aware multicast extensions of LPBR) 2.R-MLPBR (receiver-aware multicast extension of LPBR).NR-MLPBR not aware of the receiver from mulicast combination it guess the minimum hop path to source.It used Dijkstras minimumhop path algo-rithm for global topology prdiction.R-MLPBR aware of the receiver from multicast combination.It guess path to source which has minimum non receiver nodes.

One of the drawback of this protocol is overhead of the control messages.and there is unnecessary consumption of energy at node i.e.energy consumption for message transmis-sion,energy consumption for receiving message and energynconsumption at idle state.Table 1 shows all available protocols for stability,QoS of route,multicast,anycast routing protocol with its some limita-tions.

III CONCLUSION

In this paper we have studied different routing proto-cols.These routing protocols are used to improve performance of routing in MANET.But these protocols have certain limita-tions.Mobile nodes in MANET changed their topology dyan-mically.Routing protocols in MANET used for minimal con-trol overhead,minimum processing overhead,dynamic chang-ing topology maintenance.These protocols find stable,non con-gested node,minimize the energy consumption of node and provide better result.There are multiple routing protocols have been developed by different authors for minimize bandwidth of network,minimize the resources usages of network improve reliability.To find Stable nodes,reliable route,non congested path are important issues in MANET.Therefore new routing proto-col can be implement to improve network performance in MANET.

Table 1 Different Routing Protocol And Its Limitations

Routing Protocol Name	Extension Of	Category	Advantages	Limitations
Mobility and QoS aware anycast routing(MQAR)	DSR	Anycast	QoS anycast routing protocol Provide stability model,congestion model for reliable and stable route	Not efficient in high throughput environment
QoS multicast routing protocol using reliable node selection scheme(QMRPRNS)	MAODV and EMAODV	Multicast	QoS based multicast routing protocol Reliable neighbor node selection	Overhead of table maintenance Overhead of table updation
Moralism multicast routing	ODMRP and EODMRP	Multicast	Reliable data communication.Path redundancy.Reduce route reconfiguration	Chances of link failure
Geographical Predictive routing protocol	GPSR	Multicast	QoS based networking framework for increasing multimedia streaming performance	Unable to predict change in mobility
On demand source routing with reduced packets protocol(DS2R2P)	DSR	Multicast	Reduces header size Provide routing path with reduce integer value	Overheadof maintaining RREQ,RREP packets
Multiconstrained and multipath QoS aware routing protocol(MMQARP)	AODV	Multicast	Provide reliable link.Provide energy efficient paths	Chances of unnecessary flooding of packets
Link state QoS routing protocol	OLSR	Multicast	Reduce packet loss.Lower response time.Minimize recalculation of MPR	Performance degrades if path overhead occur
ANFIS and agent based bandwidth and delay aware anycast routing	SATR	Anycast	Reduce bandwidth Reduce link delay Reduce packet loss rate Higher packet delivey ratio	Performance degrades at the time of multiple anycast route Poor quality of service
Mobility and load aware routing protocol	AODV	Multipath	Controls flooding of packets Reduce broadcast strom problem	Not considering link quality,remainingpower capacity,node's density Traffic type while maskingrouting decision
Early congestion detection and adaptive(EDAPR)	EDAODV	Multipath	Improve performance by reducing delay,roting overhead	Not suitable in case of high packet loss.
Location Prediction based routing(LBPR)	FORP	Multipath	Multipath routing protocol	Overhead of control messages.Unnecessary consumption of energy at node

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