

A Review: Stability of Nodes and Routing in MANET

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Abstract---MANETs can manage without fixed infrastructure and can stay active rapid changes in the network topology. The challenge in building a MANET is equipping each device to continuously maintain the information required to appropriately route traffic. Routing with high scalability and robust performance are the key challenges in deploying Mobile Ad-Hoc Networks. In order to operate the Ad-Hoc Networks more efficiently, suitable on-demand routing protocols have to be incorporated to find effective routes between source and destination. The dynamic topology of a mobile ad hoc network (MANET) poses a real challenge in the design of a MANET routing protocol. Since last 10 years, a variety of routing protocols have been developed and their performance simulations are made by network researchers. In this paper, we deliberate on different routing protocols which are widely used in MANETs. We have also emphasized on node stability which is an important consideration to enhance network efficiency.

Keywords: MANETs, Routing, Stability

I. INTRODUCTION

As the significance of computers in our daily life is increasing, it has set some new demands for connectivity. Wired solutions have been around for a long but there is large increase in demand on working of wireless solutions. Wireless communication between mobile users is growing more popular than ever before. This growth is due to the technological advancements in the field of computers and communicating devices. Technology has enabled computers and communicating devices (like laptops, mobile phones, tablets, wireless modems, etc) to be equipped with radio interfaces to communicate on fly. Wireless networking enhances the utility of carrying a computing device. It provides the mobile user with versatile and flexible communication and continuous access of networked services.

A Mobile Ad Hoc Network is the collection of wireless mobile devices which are able to communicate and moving at the same time via dynamic wireless links. Neither pre-existing infrastructures nor centralized administration functions are needed thus are self-organization and adaptivity important properties. MANET can represent a concrete example of support for computing. MANETs stand for Mobile Ad hoc Networks. Mobile implies "mobility". Ad hoc is a Latin word and it means "for this only". MANET is the different collection of mobile routers or nodes which can communicate over wireless links. MANET is an Infrastructureless wireless network technique. The routers or nodes can move randomly and organize themselves. The nodes communicate via wireless links within each other's radio range; while they are distant apart use other nodes as a relay, in a multihop routing function. As all the nodes are mobile, the structure of the network

changes dynamically and it is unpredictable over time. The Adhoc networks are self-configured and self-organized, so to cope communication between nodes in the network, each node is behaving as a transmitter, a host and a router.

Kumar [11] explained routing is an act of moving information from a source to a destination in an internetwork. So At least one intermediate node in the internetwork is encountered while transferring of information. Basically there are two activities involved in the concept of determination of the optimal routing paths and transferring the packets via the internetwork. The transferring of the packets through the internetwork is known as the packet switching and the path determination could be very complex.

Routing protocols uses a several metrics as standard measurement to evaluate the best path for routing the packets to its destination that can be number of hops, which are used by the routing algorithm to calculate the optimal path for the packet to its other destination. The process of path determination is routing algorithms find out and maintains routing tables, which contain the total route information for packet. The information of route varies from one routing algorithm to another one. The routing tables are written with entries in the routing table are ip-address prefix and the next hop. Destination or next hop by sending the packet to a route representing the address prefix specifies a set of destinations for which the routing entry is valid. Routing is mainly classified into two types: static and dynamic routing.

II. STABILITY BASED ROUTING IN ADHOC NETWORKS

For improving the routing efficiency, we need to select the most stable path so as to reduce the latency and the overhead due to route reconstruction. To improve the throughput and reduction of traffic latency, it is essential to ensure reliable source-destination connections overtime. A route should be selected based on some knowledge of the nodes motion and on a probability model of the path future availability.

Classic proactive and reactive routing protocols apply a simple additive cost metric (often the hopcount) to compute shortest paths towards destinations. Often, shortest paths are not reliable when the network topology changes dynamically. To illustrate, let us imagine a shortest path with minimum number of hops. Such a path corresponds to links (hops) that rely far nodes in the space. This kind of links may be very unstable due to the mobility of the extremities. Finding more stable routes is an important goal in dynamic multi-hop ad hoc networks. Identifying stable paths permits to decrease control traffic and the number of route interruptions. A new routing paradigm can be obtained by considering the route stability or resiliency as routing metric. Stability based routing aims at choosing routes that has more stability in time. So, these latter can be resilient to dynamic changes in the network topology.

If the events (such that the exact trajectory of the nodes, the power battery level, the associated user behavior, the network failures, etc.) are predictable and known in a MANET, then the best route can be computed to satisfy a communication request. Generally, these factors are not predictable and so it is not possible to create a good deterministic routing model. Practical observation based and more sophisticated, statistical and probability based routing models exist to deal with long life routing.

III. RELATED WORK

Bindra et al. (2010) evaluate the performance of AODV and DSR routing protocol for a scenario using Reference Point Group Mobility (RPGM) Model. They concluded that in RPGM with CBR traffic sources, AODV is better than DSR. But when TCP traffic used, DSR perform better in stressful situation like high load or high mobility. DSR routing load is always below than AODV in both two types of traffic. Average end-to-end delay of AODV has less value than DSR in both type of traffic. Over all the performance of AODV is better than DSR in CBR traffic and real time delivery of data. But DSR perform better in TCP traffic under the limited bandwidth. [3]

Bakalis et al. (2010) used NS-2 simulator to analyze the DSR routing protocol for TCP and CBR traffic models for different mobility under varying pause time. The performance metrics used are packets dropped, average end to end delay and throughput. Based upon the results, CBR outperforms TCP at both low and high mobility with high throughput, less average end to end delay and fewer packets dropped. And also TCP performs reasonable well with the increase in pause time. So TCP can be used for small networks with less topology changes.[2]

Sharman et al. (2011) had studied Manet routing protocol by using NS-2. After their analysis and comparison, they have given conclusion that AODV is performing much better than DSDV and DSR in throughput and average delay, whereas DSR is the best in case of Packet delivery ratio. Finally by taking all metrics in account, AODV was better.[12]

Khan et al. (2011) concluded that when the MANET setup for a short time, then AODV is better option because of low initial packet loss than DSR. On the other side if we have to use the MANET for a longer time so we can use both protocols, after sometimes both have the same behavior. AODV have very good packet receiving ratio as compared to DSR. At the end, they concluded that the combined performance of both AODV and DSR routing protocol could be the best solution for routing in MANET.[10]

Kaur et al. (2011) has used Qualnet 5.0 to compare DSR and AODV protocols in terms of packet delivery ratio, routing overhead, throughput, optimal path and average end to end delay. In case of packet delivery ratio and throughput, DSR is a better option than AODV. The average end to end delay of DSR is low than AODV. DSR and AODV is almost equal in case of routing overhead. So, in case of random mobility DSR outperforms AODV.[8]

Adam et al. (2011) evaluates the performance of two reactive routing protocols (AODV & DSR) and one proactive Routing protocol (OLSR) for multimedia transmission over Vehicular Adhoc Networks (VANETs).

The NS-2.34 network simulator is used for simulation. The performance metrics used are packet delivery ratio, end to end delay, jitter and routing overhead. The results concluded that DSR outperforms OLSR and AODV in terms of average end to end delay and jitter. So, it makes DSR a better choice for multimedia transmission.[1]

McCanne et al. (2012) used OPNET modeler to evaluate the performance of AODV, OLSR and DSR routing protocols of MANET using FTP and HTTP traffics. Throughput and end to end delay are used as performance metrics. Analysis reveals that DSR has highest delay while OLSR has the lowest, And AODV has highest throughput but OLSR has least. And in case of traffic chosen, HTTP has less delay and throughput as compared to FTP.[14]

Rajkumar et al. (2012) two on demand routing protocols; AODV and DSR are simulated using NS-2 simulator. The performance is measured in terms of throughput, jitter, packet drops and routing overhead against pause time. The number of nodes is fixed to 90 nodes. At the high number of nodes, AODV outperforms DSR in both low and high mobility. AODV yields better throughput, less delay and it consume less energy as compared to DSR. Also, AODV has less number of packets dropped than DSR. So, AODV is an ideal choice for UDP protocol for communication.[16]

Mali et al. (2012) used NS-2 simulator to investigate the performance of DSDV, AODV and DSR routing protocols of MANET under CBR and TCP traffic by increasing the node density. Comparative analysis are done using metrics such as packet delivery ratio, average end to end delay, normalized load and average jitter as performance indicators. Overall, all performance metrics of all three routing protocols shows better results for TCP traffic than CBR traffic.[13]

Richard et al. (2013) has represented the problem of provisioning management or by monitoring nodes within the highly dynamic network environments, particularly virtual networks. In network, in which nodes and links may be spontaneously created and destroyed (perhaps rapidly) there is a need for stable and responsive management and monitoring, which is not creating a large load for the system. A subset of nodes has to be chosen for management/monitoring, each of which is managing a subset of the nodes in the network. A new and locally optimal greedy algorithm called Pressure is given for choice of node position to minimize traffic. This algorithm is merged with a system to predict the lifespan of nodes, and a tunable parameter is also given so that a system operator can express a preference for elected nodes to be chosen to reduce traffic, to be "stable," or some compromise between these positions. The merged algorithm called Pressure Time is lightweight and can be run in a distributed manner. The concluded algorithms are examined both in simulation and in a test bed environment of virtual routers. They are performing very well, both at reduction of traffic and in choosing long lifespan nodes.

IV. CONCLUSION

A Mobile Adhoc Networks (MANETs) is a collection of wireless nodes which are autonomous in nature. MANET is a self configuring and self organizing collection of mobile nodes interconnected by wireless links. So, the topology of

MANET changes rapidly and unpredictably. So, routing in MANETs is a very challenging task. Each and every routing protocol of MANET has its own characteristics and performance levels. So, it is very important to identify the most efficient routing protocol for a given scenario. As day by day, new technology advancements are taking place in MANETs, challenges are also increasing. Much of research for MANET's routing protocols has been done on Constant Bit Rate (CBR), Transmission Control Protocol (TCP) traffic type. Mobile ad hoc network is wireless network of mobile nodes with no centralized management and control. This paper discussed existing protocols in adhoc networks and also discussed the existing techniques for management of nodes to increase stability.

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