Routing Mechanisms to Reduce Delay in Mobile Ad hoc Networks: A Survey

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*Abstract-*Mobile Ad hoc Network (MANET) is a self-configuring, dynamic, multi-hop and infrastructure less wireless network. Nowadays, MANET is used in various applications such as military, navy, multimedia, etc. The main challenge of MANET is to provide Quality of Service (QoS). This paper discusses various mechanisms to reduce the time delay when transferring the heterogeneous data from one node to another node. A survey is done on the existing techniques that reduce the time delay in MANET. This paper also discusses some familiar routing protocols for data transfer in MANET.

Keywords: **MANET, Quality of Service, Delay, Routing Protocols**

I. INTRODUCTION

Each device in MANET is free to move independently in any direction. Therefore, the path links changes frequently. In MANET each node transfers the packet from one node to another node without base station control. Each node acts as a host and router. Node can be called as router in MANET. Each device is not depending on the base station or any centralization. MANET cost is very low. It is a main advantage of MANET. It has some challenges to provide QoS to the user. Oscan be varied from one application to another. Applications like file transfer and authentication services require high reliability. But other applications like audio, video will require low reliability and high speed. QoS parameter can be classified into two types, namely Qualitative QoS parameter and Quantitative QoS parameter.

- Qualitative is non-measurable parameters which includes security, reliability, manageability, etc.
- Quantitative is measurable parameters like delay, jitter and bandwidth.

A. Types of MANET

- InVANETs – Intelligent Vehicular Ad hoc Networks make use of artificial intelligence to tackle unexpected situations like vehicle collision and accidents.
- Vehicular Ad hoc Networks (VANETs) – Enables effective communication with another vehicle or helps to communicate with roadside equipment.
- Internet Based Mobile Ad hoc Networks (iMANET) – helps to link fixed as well as mobile nodes.
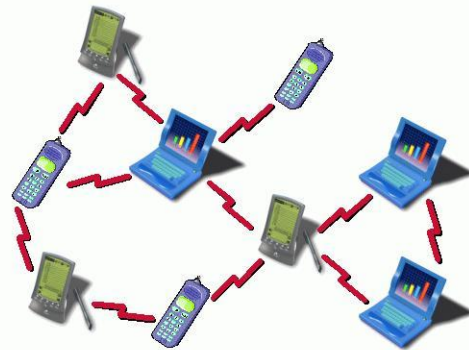

Fig 1. MANET presentation

B. Important Characteristics of MANET

- In MANET, each node acts as both host and router. Therefore, node can be called as router also.
- It is multi-hop wireless network.
- A base station or centralized firewall is absent here.
- The nodes can join or leave the network anytime, making the network topology dynamic in nature.

- Mobile nodes are characterized with less memory, power and require fewer resources.
- MANET has limitations in speed, reliability, efficiency, stability and capacity of wireless links when compared with wired network

C. Delays in MANET

Delay is the main challenge for MANET in providing Qualitative QoS. The user will be looking for high speed connection low cost, security etc. MANET has more limitation on speed. Finding the best route is the important factor to reduce the time delay. Frequently used router is increase delay of the data transfer. Various protocols are used for best route discovery.

D. Table-Driven (Proactive) Routing

This type of protocol maintains the route between the nodes by periodically distributing routing table through the network.

The disadvantage of this protocol is slow reaction on restructuring and failures. Proactive algorithms are Optimized Link State Routing (OLSR), Destination-Sequenced Distance Vector (DSDV), Babel, etc.

E. On-Demand (Reactive) Routing

The protocol finds a route when only needed by broadcast the Route Request packet through the network.

The disadvantage of this protocol is high latency time when finding route. Reactive algorithms are Ad hoc On-Demand Distance Vector (AODV), Dynamic Source Routing (DSR), Fast Super Decoupled State (FSDSR) estimator in Rectangular, etc.

F. Hybrid (Both Proactive And Reactive) Routing

The protocol combines the advantages of proactive and reactive routing algorithms. The route is initially established with some proactively prospected routes. It serves the demand from additionally activated nodes through reactive flooding.

Disadvantage is reaction to traffic demand depends on gradient of traffic volume. Hybrid algorithms are Zone Routing Protocol (ZRP). In ZRP, IARP acts as proactive and IERP acts as reactive component.

G. Hierarchical Routing Protocols

The protocols the choice of proactive and of reactive routing depends on the hierarchic level in which a node resides.

Disadvantage of this protocol is reaction to traffic demand depends on meshing parameter. Hierarchical routing algorithms are Cluster-Based Routing Protocol (CBRP), Fisheye State Routing Protocol (FSR), etc.

II. PREVIOUS WORK

YuvrajKumbharey, et al.,[1] discussed to reduce the traffic during route discovery by clustering nodes into groups. The advantage of this paper is reducing the routing overhead and to improve the route discovery by RCBRP algorithm that is integrating the inter-cluster on-demand and intra-cluster table driven routing.

Iftikhar Ahmad, et al.,[2] described AODV routing protocol provide guarantee for real time traffic in MANET. It improves the route discovery mechanism for AODV routing protocol and the transmission ratio for real time data. Therefore, the transmission delay will be low and throughput will be high. But, it has some limitation because if number of nodes high then the calculation value of the transmission ratio 'R' will be difficult.

Mamoun Hussein Mamoun, et al.,[3] presented an effective route selection technique using DSR routing protocol for MANET. The goal of paper is minimize the cached route request (RREQ) for the Dynamic Source Routing (DSR) protocol. Best routing paths are selected to rebroadcast of route discovery packets. The research concentrates on link strength, node energy and number of hops. The limitation is that the mechanism will be difficult unless more number of nodes should be perfect.

P.Calduwel Newton, et al.,[4] presented " A Quality of Service Performance Evaluation Strategy for Delay Class in General Packet Radio Service". It evaluates the performance of data transfer with respect to delay. These techniques are used to understand and analyze the problem. And also used for identify the misbehaving nodes and they are corrected. The limitations that the outcomes of the analysis are theoretical, not implemented.

Rajkumar G, et al., [5] explained to reduce the time delay in MANET using Improved Fault Tolerant

Multipath Routing (IFTMR). Using IFTMR establish a path that is based on the node strength and battery power. Node strength is identified by successful transmitting node and the threshold value. It works effectively only when multiple intermediate node fails but not suitable for small number of failures.

Yuchen Fu, et al.,[6] implemented "Research of QoS Routing Algorithm in Ad Hoc Networks Based on Reinforcement Learning". It estimates the link quality between the nodes and chooses the best path for transferring the data between the nodes using SNLQ routing algorithm with reinforcement learning. Overload will occur on particular one route because, this algorithm selects only high quality route. Therefore, more transaction has been done through that the route.

Kumar Prateek[7] discussed proactive and reactive routing algorithms and evaluates these protocols performances such as DSDV, AODV and DSR.

In DSDV each mobile station maintains a routing table. When the data is transfer, the sequence number is assigned to the intermediate nodes by the destination node. The nodes periodically update their routing table to the neighbor node. However, maintenance of DSDV will be overload.

In AODV to find a path to the destination, source node broadcast the Route Request (RREQ) to its neighbors. RREQ broadcasts only when needed. Destination node sends Route Response (RRES) to the source node through the reverse path of RREQ when RREQ find the destination. It is an On-demand routing protocol.

In DSR protocol, each node maintains a route cache itself for route discovery process should rapidly and route maintenance. When source node wants to send a data to the destination, it initially searches in route cache to determine if it already contain path to the destination. Therefore, the time to find the destination node will be reduced. If a path is not in route cache then the source node broadcast the RREQ to the neighbor nodes and then finds the destination that the path will be stored in route cache of source node.

III. SUMMARY

This paper surveyed various routing mechanisms that reduce the delay in MANET. However, reducing delay is a challenge and potential research problem.

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