



## A Survey on Congestion Control Technique in MANET/Review Paper

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**Abstract---** *The purpose of this research is to study and analyze various congestion control mechanisms using a number of routing protocols in Mobile Adhoc Network (MANET). As MANET is infrastructureless network so node movement and data load traffic which exceeds the network capacity, can not be predicted which leads to problem of congestion. The objective of this paper is to design a comparative analysis of different routing protocols e.g. proactive routing protocols(DSDV), Reactive routing protocols (DSR,AODV,AOMDV) and Hybrid routing protocols(ZRP).*

**Keywords---** *Mobile Adhoc Network (MANET); DSDV; DSR; AODV; AOMDV; ZRP.*

### I. INTRODUCTION

Mobile ad hoc networks (MANETS) is a part of Multihop networking which use two or more hops to convey the information from source to destination and consists of a group of mobile nodes that communicate without requiring a fixed wireless infrastructure. MANET contains Dynamic network topology, Frequent routing updates and Nodes that can perform role of both host and router. Figure demonstrates movement of node C which changes the topology:

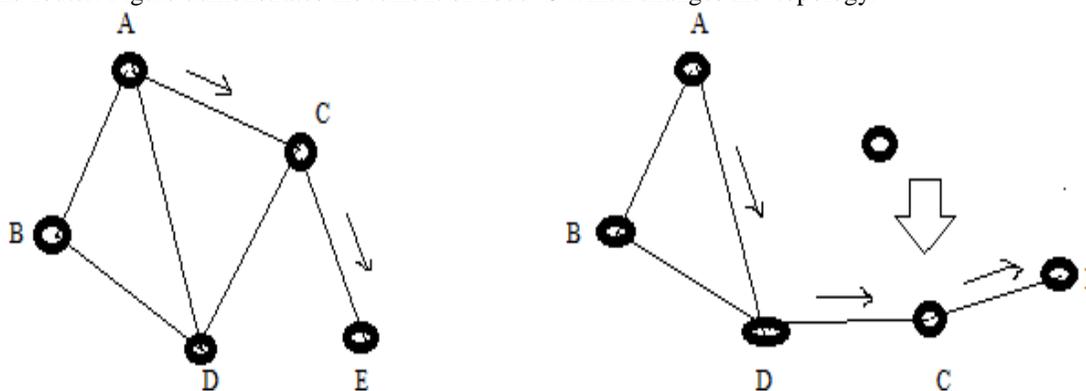


Figure : change in topology due to movement of node C.

MANET have a number of advantages like it provide an access to information and services instead of geographic location and these networks can be maintained or set up at any time and place.

MANETs has some disadvantages too e.g. Less physical security, limited resources, Intrinsic mutual trust is more vulnerable to be attacked, malicious nodes are hard to detect due to Volatile network topology.

These networks have several applications as follows:

- Military or police exercises.
- Wireless LAN s
- Disaster relief operations
- Mine site operations.

### II. CONGESTION

When the number of packets increases beyond the limit that can be handled by the network resources which results degradation in network performance is called congestion. Congestion is overcrowding or blockage due to overloading .A network that is congested from the perspective of one user is not necessarily congested from the perspective of another. For

example, if user A can tolerate a packet loss rate of 1 in 1000, and user B can tolerate a packet loss rate of 1 in 100, and the actual loss rate is 1 in 500, then A will claim that the network is congested, whereas B will not. A network should be called uncongested only if all the users agree that it is congested.

### **III. CONGESTION CONTROL**

There are three styles of congestion control as follows:

- 1) *Proactive Control*: In this scheme, the congestion control mechanism is to make reservations of network resources so that resource availability is deterministically guaranteed to admitted conversations. It requires each node to maintain a routing table (Destination address, Sequence number and metric) for next hop to reach a destination node and number of hops to reach destination. Users can be allowed to send data without reservation of resources, but with a possibility that if the network is heavily loaded, user may receive low utility from network. One of the proactive control protocol is DSDV (Destination Sequenced Distance Vector)
- 2) *Reactive Control*: This method is applicable in reservation less networks. In this case, users have to adapt according to changes in network state and congestion control refers to the way in which a network can allow users to detect changes in network state. Reservation less networks are more prone to congestion. Some of the reactive routing protocols are:
  - DSR (Destination Sequence Routing Protocol)
  - AODV (Adhoc On Demand Distance Vector)
  - AOMDV (Adhoc On Demand Multipath Distance Vector protocol)
- 3) *Hybrid Routing Control*: It combines the advantages of both proactive control and reactive control protocols e.g. ZRP (Zone Routing Protocol) and gives more efficient congestion control.

### **IV. NEED FOR CONGESTION CONTROL**

Congestion is a severe problem in current reservation less networks in which no routing table is maintained at each node. There is a need of congestion control in networks so that the available bandwidth, switching speeds and capacity of network to route data, can be increased to several orders of magnitude.

### **V. RELATED STUDY**

S.R. Biradar[1] proposed a technique for design of robust routing algorithms in MANET that adapt to the frequent and randomly changing network topology. The proposed algorithm contains comparison and evaluation of the performance of two types of On demand routing protocols- Ad-hoc On-demand Distance Vector (AODV) routing protocol, which is unipath routing protocol and Adhoc On-demand Multipath Distance Vector (AOMDV) routing protocol. By comparing the performance of AODV and AOMDV, the AOMDV has more routing overhead and packet delay than AODV but it incurs a better efficiency in case of number of packets dropped and packet delivery.

Makoto Ikeda [2] proposed TCP congestion control for Multiple traffic in MANETs. For network simulations ns-3 network simulator is used considering Ad hoc On-Demand Distance Vector (AODV) and Optimized Link State Routing (OLSR) routing protocols. MANET performance considering random waypoint mobility model for different number of nodes by sending multiple traffic in the network is presented and it is found that coupling congestion control mechanisms between multiple flows has problems in some cases.

Sunita Nandgave-Usturge[3] designed a Routing mechanism in MANET to avoid link failure due to its mobility feature, interference and congestion. Interference occurs due to collision and hidden node. Hidden node interference can be reduced by using RTSCTS-handshake method of 802.11 MAC. This proposed scheme showed that AODV has better congestion avoidance mechanisms.

Lawal Bello[4] described a simulation study of the impact of topology control and traffic models on the performance of Mobile Ad Hoc Wireless Network routing protocol in a dynamic changing topology. Simulation results show that Constant Bit Rate outperformed TCP (Transmission Control Protocol) in all chosen metrics except for Transmission Control Protocol which was able to handle packet delivery in large topologies than CBR but at the cost of increase in overall delay in the network. Simulation result showed that growth in spurious packet drops in TCP is due to its slow start which invokes its congestion control algorithm.

S.C. Sharma[5] proposed an analysis to find a finest routing protocol, which can be used to transmit information from source to destination across entire multihop network with any topology. The broadcasting is used to transmit information among all neighbors and thus route establishment. This approach makes it quite challenging to control channel contention problem, redundant rebroadcasts, packet collision and bandwidth congestion.

Razia Nisar Noorani[6] proposed a scheme for comparison of congestion control between different routing protocols in MANET which is also called short lived networks. This scheme consists of simulations that are carried out by using Network Simulator-2 (NS-2) with two MANET Reactive Routing protocols i.e. Ad-hoc On-demand Distance-vector (AODV) and Dynamic Source Routing (DSR) Protocol. These protocols are analyzed in accordance with their best performance of average end-to-end delay and packets delivery rate under TCP Vegas with mobility consideration at different pause time values. Simulation indicates that AODV has low average end to end delay and a better throughput performance as compared to DSR but AODV accommodates a high packet drop.

Hitesh Gupta[7] performed a survey on routing based congestion control algorithms in Mobile ad-hoc network. In this survey multipath routing and load aware techniques both provide a more reliable as well as load awareness of each node to minimize the data drop but all given approaches use routing based congestion control. In this survey, the congestion control is through dynamic queue management technique and simulation parameters. Further the proposed work and proposed algorithm simulate through all network parameter for performance evaluation.

Shamurailatpam susanta sharma[8] describes a comparison of different routing protocols in 4G Mobile Adhoc Network. Multimedia real time system like voice, videoconferencing and data with Quality of service support challenging task MANET. The new generation technology need increase in routing efficiency, security, bandwidth, power consumption, collision control due to mobile nodes move for achieving 4G Network and resulting best. The proposed work consists of five routing protocols (AODV, DSR, GRP, OLSR, TORA) to compare these routing protocols in terms of upload response time, throughput, download response time and delay for the best performance on 4G network systems with an extension of MANET.

Ştefan Stăncescu[9] performed a comparative analysis for the best routing protocol for specific applications of Wireless Sensor Networks (WSN). The Proposed work consists of simulated and tested routing protocols such as pro-active DSDV and reactive DSR, AODV and AOMDV protocols in WSN. Parameters like end to end delay, throughput, network's life, number of packets received, time of finding the routes, percentage of receiving and normalized routing load are measured and monitored in this work.

Above comparative study can be summarized into a table as:

TABLE 1: COMPARISON OF DIFFERENT ROUTING PROTOCOLS

Sr. no.	Parameters	AODV	DSR	DSDV	AOMDV
1	Throughput Performance	High	Less	Lowest	Moderate
2	Average end to end Delay	low	high	highest	lowest
3	Packet drop ratio	high	low		lowest
4	Data error	more	less	lowest	
5	Routing overhead	low		high	moderate
6	Packet delivery rate	high	low		highest

## VI. CONCLUSION

This comparative analysis is accomplished on the basis of a number of parameters like average end to end delay, throughput, changing number of nodes and topology, routing packet overhead and packet delivery ratio using Network Simulator (NS2). The routing protocol which gives optimum results based on these parameters leads to best congestion control mechanism in MANET.

## REFERENCES

- [1] S. R. Biradar, Koushik Majumder et. al. , *Performance Evaluation and Comparison of AODV and AOMDV*. Vol. 02, IJCSSE 2010.
- [2] Makoto Ikeda, Elis Kulla et.al. , *TCP Congestion control in MANET for multiple traffic considering reactive & proactive routing protocol*, IEEE 2012.
- [3] Mrs. Sunita Nandgave-Usturge., *Study of congestion control using AODV and signal strength by avoiding link failure in MANET*, IEEE 2011.
- [4] Lawal Bello, Panos Bakalis et. al., *Impact of Topology Control and Traffic Models Performance on Mobile Ad Hoc wireless routing protocol*, IEEE 2011.
- [5] PermaNand, & S.C.Sharma , *Comparative analysis of broadcasting techniques for routing protocols*, IEEE 2011.
- [6] Razia Nisar Noorani, *Comparative Analysis of Reactive MANET Routing Protocols Under the Traffic of TCP VEGAS with Mobility Considerations*, IEEE 2009.
- [7] Hitesh Gupta, Pankaj Pandey , *Survey of Routing Base Congestion Control Techniques under MANET*, IEEE 2013.
- [8] Shamurailatpam susanta sharma et.al., *Issues of MANET Routing Protocols on 4G Network*, IEEE 2013.
- [9] Ştefan Stăncescu et al., *Optimal Routing Protocols In Wireless Sensor Network*, IEEE Oct 2013.
- [10] Ehssan Sakhaee, Tarik Taleb et.al., *A Novel Scheme to Reduce Control Overhead and Increase Link Duration in Highly Mobile Ad Hoc Networks* , IEEE 2007.
- [11] J.Premalatha , P.Balasubramanie, *Enhancing Quality of Service in MANETS by Effective Routing*, IEEE 2010.
- [12] Li Yuanzhou , Hu Weihua, *Optimization Strategy for Mobile Ad Hoc Network Based on AODV Routing Protocol* , IEEE 2010.