ISSN(Online): 2320-9801
ISSN (Print): 2320-9798

International Journal of Innovative Research in Computer and Communication Engineering

(An ISO 3297: 2007 Certified Organization)

Vol. 4, Issue 10, October 2016

A Survey on Effective Improvement in Network Congestion Dominance Routing Protocol in MANET

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ABSTRACT:A mobile ad hoc network (MANET) is determined as a network that has many free autonomous nodes i.e. that can move locations and configure itself. It is often composed of mobile devices that can arrange themselves in various ways using wireless connections such as a cellular or satellite transmission to connect to various networks and operate without strict top-down network or any centralized administration. There are various applications of MANET, In Commercial Sector: Ad hoc can be implemented in emergency, rescue operations for disaster relief efforts, e.g. in fire, flood, or earth-quake. Local Level: e.g. conference or classroom. In mobile ad hoc network, congestion can take place between two intermediate nodes, Congestion occurs when bandwidth is insufficient and network data traffic exceeds capacity. This paper mainly studies and compares the performance of MANET routing protocols namely PSR, DSR, DSDV and AODV under various traffic loads with various maximum TCP congestion window size to improve congestion control in the routing. The metrics used to compare routing protocol performance are packet delivery ratio, average routing load, the average end-to-end time required with delay and average network throughput and mainly to overcome congestion situation and avoid packet loss in wireless networks.

KEYWORDS: Congestion control, Mobile ad hoc networks(MANET), Proactive and reactive routing protocol..

I. INTRODUCTION

Mobile ad-hoc network is dynamic in nature and due to the feasibility of having every node works on temporary bases there is no centralize control because and frequently changes their location and hence there is zero possibility to find the location of where the real destination node is and what changes in the location of the nodes can take. There might be a situation may occur when the whole data or some of data is not able to reach at destination on time because of congestion or because of any other reasons in the network, as data is dropped in the network.

Table-driven (proactive) routing :

This kind of protocols maintains fresh lists of destinations and their routes by distributing routing tables at regular intervals of time throughout the network. The overhead with this is need of Respective amount of data for maintenance along with slow reaction on restructuring and failures.[3]

Examples of proactive algorithms are:

1. Destination Sequence Distance Vector :DSDV
2. Optimized Link State Routing Protocol :OLSR
3. DREAM

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- **On-demand (reactive) routing:**

This kind of protocol finds a route on demand by overloading the network with Route Request packets due to which there is high latency time in route finding. There are also chances of network clogging due to excessive flooding.

Examples of on-demand algorithms are:

1. Power-Aware DSR-based[5]
2. Ad hoc On-demand Distance Vector: AODV
3. Dynamic Source Routing (RFC 4728)[2][3]
4. Flow State in the Dynamic Source Routing[4]

- **Congestion control:**

Manages traffic involvement into a telecommunications network, to overcome congestive collapse by overcoming over subscription by decreasing the rate of packets. It completely different from flow control, which avoids the sender from overloading the receiver. The goal of congestion control is to manage the number of packets inside the network below the level at which performance leads to decrease.
There are various ways developed for congestion control:

1. Adaptive Congestion Control
2. Rate Control Protocol
3. Explicit Congestion Control Protocol

II. LITERATURE SURVEY

This paper explains briefly problems with their respective solution that occurs due to congestion control in high speed network. Based on the study of different papers there are some important issues related to the proposed model. There are still some limitations with several protocols that were previously used for congestion control. TCP, a widely used protocol, works well in low speed data network but fails in high speed network, it gives poor performance. The old protocols were not able to satisfy main design requirements of congestion control protocols, such as high utilization, max min fairness, small queue sizes and no observable packet drops. To fix these issues new adaptive protocol introduced that has a learning capability [2].

Figure1. Architecture of fault tolerance service

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The sub-service prediction detects a failure which may occur or disconnection of the network by establishing a list of critical object. Each controller can know the present status of all nodes of its group. To analyze the criticality, the sub-service can detect frequent failure or shutdown along with several types of items critical energy point. If there is fall in an energy level of a node [5]. When the routing protocols in MANET are not able to indentify about the congestion, it results in the following issues. [6]

Long delay: This holds up the process of detecting the congestion. When the congestion is very complicated, it is better to select an alternate new path.

High overhead: Largely processing and repeated communication attempts are necessary for a new route discovery. If the multipath routing is utilized, it requires additional effort for upholding the multi-paths regardless of the presence of alternate route in network.

Many packet losses: The congestion control mechanism attempts to reduce the excess load in the network by either decreasing the sending rate at the sender side or by dropping the packets at the intermediate nodes else by executing both the process. This results in increased packet loss rate or minimum throughput.

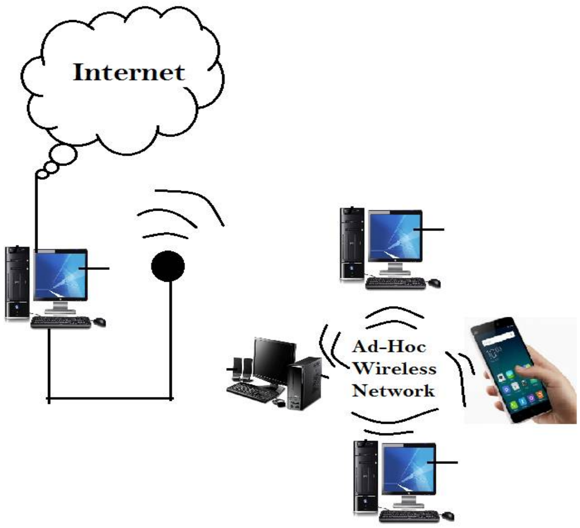

Figure1. Mobile Ad-Hoc Network

Congestion Types: Congestion can be differentiated into four different types [5]:

1. Instantaneous Congestion: It is caused by mild bursts, created naturally by business of IP traffic.
2. Baseline Congestion: It caused by systematic under-engineering of network or node capacity
3. Flash Congestion: It suggests periods of overload in a highly utilized network, where bursts from each single sources add up to create packet loss hills.
4. Spiky Delay: It a condition where no packets are forwarded for a long duration of time - the transit delay of packets increases up from few milliseconds to tens of seconds during this period.

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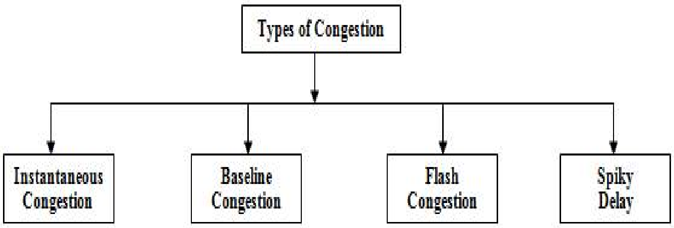

Figure2. Congestion Types

[1] "Performance Comparison of AODV, ZRP and AODVDR Routing Protocols in MANET" In Mobile Ad hoc networks (MANET) traditional congestion control mechanism RED encounters with new challenges such as high packet drop ratio, degradation of throughput and frequent link failures.

[2] "Improved Congestion Control Mechanism Using Modified Hybrid-TCP in Mobile Ad-Hoc Networks" In this paper Mobile Ad hoc Networks (MANETs) as the name signifies is a network formed by collection of mobile ad hoc devices (nodes). It is a kind of infrastructure less wireless network which is autonomous decentralized where each node is free to move anywhere at any time.

[3] "Performance Evaluation of Scalable Video Streaming in Mobile Ad hoc Networks" MANETs are wireless networks consisting of dynamic nodes that are self-configurable and infrastructure-less.

[4] "PSR: A Lightweight Proactive Source Routing Protocol For Mobile Ad Hoc Networks" With the increase in traffic in the network congestion increases, congestion unawareness in mobile ad hoc networks (MANETs) may lead to long delay, high overhead and packet loss which decreases the performance of ad hoc network.

[5] "International Journal of Computer Science and Mobile Computing" In Mobile Ad hoc Networks (MANET), mobile nodes are organized randomly without any fix access point. Due to the limited bandwidth and dynamic topology of nodes, the network congestion occurs.

III. RELATED WORK

A global search procedure issued by the route discovery mechanism in which a source node uses flooding mechanism to investigate all the available paths to a destination. Once all paths have been discovered, a source node chooses a path, which is the very short. When the shortest path algorithm is used, nodes located around the center of a network carry more traffic related to other nodes that are located at the perimeter of the same network. Particularly, when multiple connections are arranged in a network, the wireless links located at the center of the network carry more traffic and get congested. This kind of congestion problem may disturb the performance of a network in terms of delay and throughput.

The ad-hoc network does not have any fixed network infrastructure which leads to frequent changes in topology. In mobility scenarios, the shortest path may get spited due to node movement. Moreover, communication through a wireless medium is inherently unreliable and is also leads to link errors. In today's condition, many congestion control techniques have been implemented with TCP that introduce the congestion problem to the source node. The TCP congestion control mechanisms [7] are Tahoe TCP, Reno TCP, New Reno TCP and SACK TCP.

When congestion takes place, packets transferring from the source to the destination, it leads to many problems such as packet loss and long delay. This problem becomes more visible when there is large scale transmission network. There are many congestion control techniques such as EDAPR (Early congestion detection and adaptive routing in MANET) [9], where in EDAPR the node detects the congestion early and send a warning message to non-congested nodes (NHN). The non-congested nodes finds then alternative path by using adaptive path mechanism.

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Another approach for the congestion control is DCDR (Dynamic congestion detection and control routing in ad hoc networks) [8]. In DCDR, the congestion is detected by the average queue length of the node. When the congestion is detected the node sends the warning message to its neighboring nodes. The nodes then detect the alternative path to send the packets to its destination.

IV. PROPOSED WORK

In the mobile adhoc network (MANET), congestion can occur in any intermediate node, often because of limitation in resources, when data packets are being transmitted from source to destination. Congestion will result to long delay, high packet loss and waste of resource utilization time. The main goal of congestion control is to reduce the delay and buffer overflow caused by network congestion and hence enable the network to perform better. The aim of this paper, is to determine the performance measures like throughput packet delivery ratio, Average end-to-end delay and Routing overhead of MANET's Routing-PSR, AODV, DSDV, OLSR and ZRP with varying scalability and offered load under different mobility models.

Proposed the method to detect the congestion symptoms and to measure the effective flow between a user and a server with the measure of parameters like latency, jiter or loss rate.

Proposed the algorithms to reduce the packet losses due to mobility in adhoc networks and thereby improves the performance of TCP.

Proposed the algorithm for generation of EDIM control message packet (Error Detection and Indication Message), which is generated by the receiver on the basis of packet losses to reduce the packet sending rate.

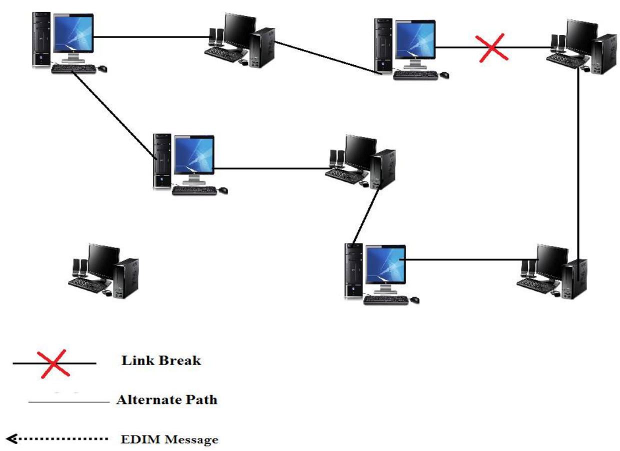

Figure3. Propagation of EDIM control message packet (Error Detection and Indication Message).

V. CONCLUSION

The main goal of congestion control is to decrease the delay and buffer overflow caused by network congestion and hence enable the network to perform better. The aim of this paper, is to determine the performance measures like throughput packet delivery ratio, Average end-to-end delay, and Routing overhead of MANET's Routing-PSR, AODV, DSDV, OLSR and ZRP with varying scalability and offered load under different mobility models.

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The multipath routing protocols proposed for MANET is widely used depending upon the environment. The OLSR protocol is basically made for large and dense network but having drawback of high loss rate of packets due to higher routing overhead relatively compared to other proactive routing protocol such as DSDV and PSR. When the nodes are neither too sparse so that the network connectivity is good nor too dense so that the channel can be spatially reused, these protocols have a fairly high Packet Delivery Ratio(PDR) of over 70% for PSR,DSDV and DSR and of 60% -70% for OLSR.

So as per above study it can be concluded that there is PDR (Packet Delivery Ratio) for PSR is about 70%. As if comparison of PSR, Packet Delivery Ratio with other protocols likes OLSR, DSR and DSDV. Packet Delivery Ratio it is relatively better because after all it's having improvement over 0%-10%. So this scenario to get works on Packet Delivery Ratio of PSR and increases the PDR from 70 to near about 90[1].

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