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# Enhancement in DSR Protocol for Load Balancing and Congestion Control

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*Abstract -* The routing protocols are classified as reactive and proactive routing protocol. The reactive protocols are the protocols which establish route from source to destination when required on the other hand proactive routing protocols are protocols in which nodes store routing tables and on the basis of these routing tables route is established between source and destination. The simulation results show that reactive routing protocols are efficient than proactive routing protocols. DSR is the reactive type of routing protocols. DSR protocol establish route from source to destination on the basis of hop counts and sequence number. There is possibility that the route which is established between source and destination will be in congestion. In this paper, we are proposing new technique for congestion control in DSR protocol. The new technique is implemented in NS2 and results show that proposed technique is better than the previous techniques.

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*GJCST-E Classification :* *C.2.4*


*Strictly as per the compliance and regulations of:*

# Enhancement in DSR Protocol for Load Balancing and Congestion Control

Shivali Katoch [α] & Reena Aggarwal [σ]

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## I. Introduction

Wireless systems, both mobile and fixed, have become an indispensable part of communication infrastructure. There applications are ranging from simple wireless, low data rate transmitting sensors to high data rate real-time systems, those used for monitoring large retail outlets or real-time broadcasting of sport events. The existing wireless technology is based on point-to-point technology. An example is GSM system with an architecture that is based on mobile nodes communicating directly with central access points. Sometimes there are networks that can't rely on the centralized connectivity such as Mobile Ad-Hoc Networks (MANET). MANET is a wireless network having mobile nodes with no fixed infrastructure. These kinds of networks are used in areas such as environmental monitoring or in rescue operations. The main limitation of Ad-hoc systems are the availability of power. In addition to running the onboard electronics, power consumption is governed by the number of processes and overheads required to maintain connectivity. The most important performance criterion for mobile users is the battery life of device. The battery life can be extended by reducing energy consumption over devices. The energy efficiency of wireless networks can be improved by designing of energy conservative protocols over radio interface. There are two main components that consume energy such as the host CPU and Wireless network interface. The progress on battery technology is steady but slow, so spending as little energy as possible on different operations is likely to remain an important design constraint for mobile solutions [1]. The use of laptops, PDAs and mobile devices has changed the business sector to improve the market of wireless networks in an ad hoc mode. MANETs have gained much importance because of the features such as they are decentralized, self organizing, adaptive and dynamic in nature. The delay, power consumption and traffic are main concerns in ad hoc networks due to its non confined nature. The MANET station acts like a router to route the information from one node to the other node as there is no access point available in ad hoc networks. Mobile ad hoc networks are dynamic in nature as the nodes are dynamically allocated without the central administration and the nodes will behave as the hosts for the file transfer protocol, email, HTTP and other applications to transmit and receive the information [2]. The DSR protocol in which the source node sends route request message and the nodes which is having route to the destination node. MANETs have the limited energy budget [7] for communication among mobile nodes, thus usage of the energy resources of a small set of nodes at the cost of others can have an adverse impact on the node lifetime as well as network lifetime.

## II. Literature Review

K. Arulanandam and B. Parthasarathy (2009) [5] gave an approach to minimize power consumption in idle mode of mobile nodes. They gave an idea to change mode of the mobile nodes from Idle to Sleep, because when nodes were neither transmitting nor receiving data packets but in Idle mode consume power as been consumed in receiving mode. They have taken two ad hoc on-demands routing protocols and performed this approach and illustrated that power consumed by these protocols, with this mechanism is less than power consumed by any other mechanism. It saved power up to 60%.

Canan Aydogdu and Ezhan Karasan (2010)[6] proposed an analytical model for the IEEE 802.11 DCF in multi-hop wireless networks that considered hidden terminals and accurately worked for a large range of traffic load that are used to analyze the energy

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consumption of various relaying strategies. The results shown that energy consumption not only depends upon processing power but also on traffic load that is the number of nodes presented in network.

Xavior pallot and Leonard E. Miller (1998) [10] proposed a design to evaluate the effectiveness of a MANET in delivering priority message service using a standard routing algorithm such as DSR but altering the protocols used at Medium access (MAC) and Physical (PHY) layers according to the IEEE 802.11 specification. in Yu (2004) [6] proposed mechanisms to make routing protocols aware of the packet lost data packets and ACKs and help reduce TCP timeouts for mobility-induced losses. He presented two mechanisms: Early packet loss notification (EPLN) and Best effort ACK delivery (BEAD). Shweta Jain and Samir R. Das (2010) [3] proposed an any cast mechanism at link layer that forwards packets to the best suitable next hop link to enable efficient packet forwarding on a multichip route. They proposed a mechanism that depends on the availability of multiple next hops, which could be computed by a multipath routing protocol. The any cast protocol provides significantly better packet delivery relative to 802.11 in variety of ad-hoc networks.

Kaixin Yu, MArioa Gerla, Sang Bae (2008) [4] shown the effectiveness of RTS/CTS in wireless ad-hoc networks. First, they analyzed the interference range for open space environment. Second, verify the data packet corruptions due to large interference range. Third, a simple MAC layer scheme proposed to combat the large interference range. They have done only trivial modification to 802.11

## III. DSR Protocol

The DSR is the reactive type of protocol .The route from the source to destination is established when required. This approach will enhance the efficiency of the network as compared to proactive routing protocols. The other reactive routing protocols are AODV and OLSA. The DSR protocol is based on the traditional Proactive DSDV protocol. In DSR protocol the source node broadcast the route request packets in the network and the intermediate nodes which is having path to the destination will reply with the route reply packets. In DSR protocol the intermediate node which further broadcast the route request packets which add its own identity in header of route request packet. When the source node start broadcasting the route request packets the header of the route request packets is empty and header will be fill by the intermediate node. The destination node will select the best path on the basis of will select best path on the basis of header value count [8]. The destination wills uncast the route establishment message to the source through the intermediate nodes. The header value update approach is inefficient approach because the header value will be over flooded. The other problem in DSR protocol selects the best path on the basis of minimum hop count and highest sequence number. But in the route which is established there should be congestion. In figure 1 the route request packets are broadcasting and in figure 2 route reply packets are unicasted by the destination node.

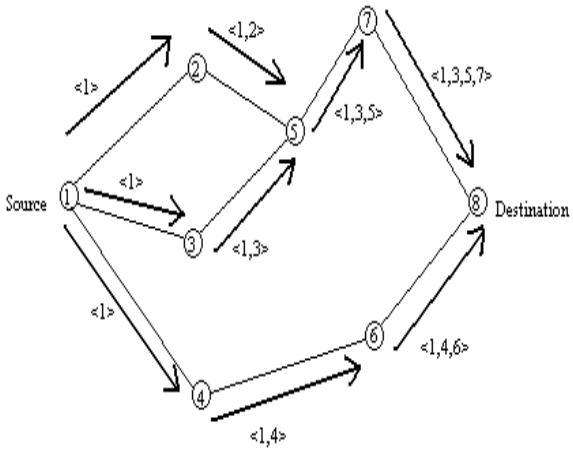


*Figure 1 :* Route request packets broadcasting

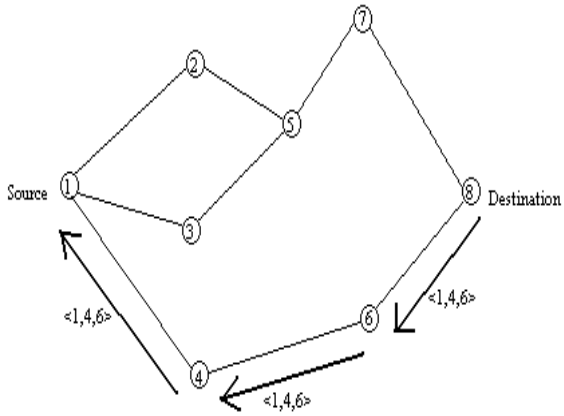


*Figure 2 :* Route reply packets unicast by destination

## IV. Congestion Problem

Wireless ad-hoc network is usually defined as a set of wireless mobile nodes dynamically self organizing a temporary network without any central administration or existing network infrastructure. The node in the wireless ad-hoc network can serve as routers and hosts. So, they can forward packets for other nodes if they are on route from source to destination. Routing is important problem in wireless ad-hoc network. Traditional working protocols cannot work well in wireless ad-hoc network because of the characteristics of the wireless ad-hoc networks. Since, mobile nodes have limited transmission capacity they mostly intercommunicate by multichip relay. Multichip routing is challenged by limited wireless bandwidth, low device power, dynamically changing

network topology, high vulnerability to failure. To answer these challenges, many routing algorithms in MANETs were proposed. There are different dimensions to categorize them: proactive routing Vs reactive routing or single path routing Vs multipath routing. In proactive Protocols, route between every two nodes are established in Advance even though no transmission is in demand. In reactive protocols, route is discovered when needed transmission and released when transmission no longer takes place. Congestion is one of the most important restrictions of wireless ad-hoc network. It may deteriorate the performance of whole network. In the current design routing is not congestion-adaptive. Routing may let the congestion happen which is detected by congestion control. But dealing with congestion in reactive manner results in longer delay and an unnecessary packet loss and requires significant overhead if the new route is needed.

## V. Congestion Problem in DSR

In this it is shown when there are more than source nodes which is sending data packets to the same destination. Than at some point the node which is common in both the route resulting in the congestion due to the queue overflow. IT will result in delay do data packet and the loss of the data.

## VI. New Proposed Technique

The route established between the sources to destination is based on hop counts and sequence numbers. The best path is that which is having minimum hop counts and higher sequence number. The sequence number tells the freshness of the route. The route which is established between the source and destination there will be congestion [9]. The route should be selected which is having minimum congestion. Before route establishment every node has to present its queue size and current number of packets in their queue. The nodes which is having higher queue size and less number of packets in their queue is selected as best node for data transfer. The Simulation results shows that proposed technique will remove congestion and applicable for load balancing in figure 1 and figure 2 the comparison graphs between previous and new proposed technique is shown.

## VII. Simulation Results & Observation

In this section, we present our simulation efforts to evaluate our observations that compare the performance of the DSR routing protocol and new improved DSR protocol and we find out that the new improved DSR has much better throughput and less delay as compare to earlier DSR. The simulation parameters are as follows:

*Table 1*

| Parameter | Value |
|---|---|
| Channel Type | Wireless Channel |
| Radio Propagation | Two Ray Ground |
| Antenna Type | Omni antenna |
| Interface Queue Type | Queue/Drop tail/ Pri Queue |
| Maximum Packet | 50 |
| MAC Type | 802_11 |
| Mobile Nodes | 11 |
| Routing Protocol | DSR |
| Network Interface Type | Wireless Physical |
| Link Layer Type | LL |

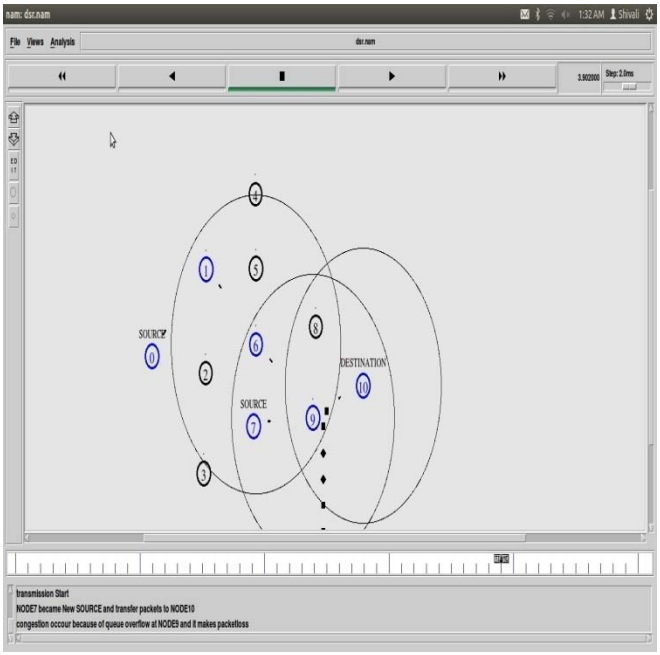


*Figure 3 :* Packet loss due to congestion

The figure 3 shows the congestion that occurs in the network due to flow of data packets from the two source node at the same destination. Resulting in the loss of data packets on the route in the network.

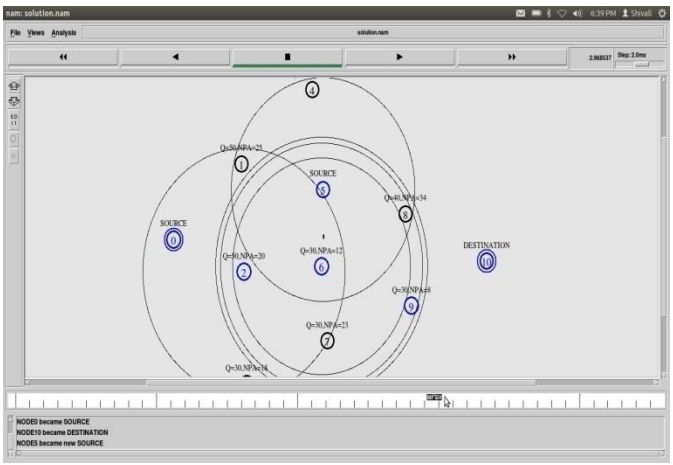


*Figure 4 :* No packet loss

In the figure 4 it is shown that the problem of congestion has been removed . Thus two sources are sending data too the same destination without much loss of data packets.

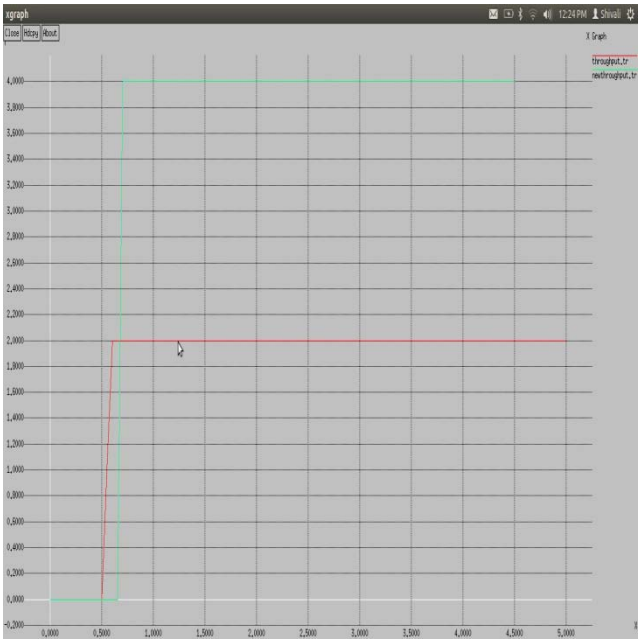

*Figure 5 :* Throughput Graph

In figure 5 the throughput graph has been plotted between the DSR and the new improves DSR and it is found the throughput of the new improved DSR is much better as compare to the earlier DSR. The red line shows the old DSR whereas green line shows the new improved DSR.

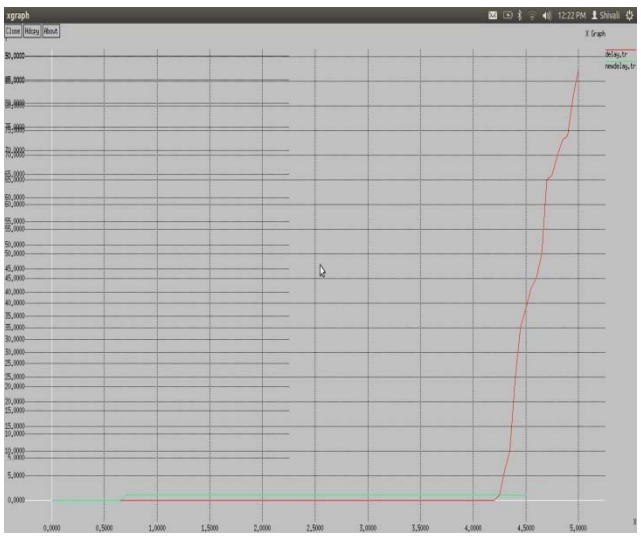

*Figure 6 :* Delay Graph

The delay graph has been plotted between the new improved DSR and the DSR and it is found that DSR has more delay than new improved DSR.

## Acknowledgment

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