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EFFICIENT SELFISH NODE MANAGEMENT METHOD FOR MANET

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Abstract— In a mobile ad-hoc network, congestion is one among the foremost necessary restrictions that deteriorate the performance of the total network. It's essential to regulate the info rate utilized by every sender so as to not overload the network, wherever multiple senders vie for link information measure. The Packets at the network is also dropped after they reach the router and can't be forwarded. Several packets area unit dropped whereas excessive quantities of packets make a network bottleneck. The proposed ESNM technique of the research uses the Watchdog method with IRTBDM to cut back the congestion rate at the MANET. The proposed technique provides a higher packet delivery ratio, scale back packet drop ratio and communication overhead over existing methods. These factors are necessary for MANET performance and reliability.

Keywords— ESNM, Congestion control, Watchdog method, Replica allocation, Selfish node.

I. INTRODUCTION

A mobile ad-hoc conjointly referred to as a wireless ad-hoc network or ad-hoc wireless network, maybe an endlessly self-configuring, infrastructure-less network of mobile devices connected wirelessly. Every device in an exceedingly MANET is absolved to move severally in any direction, and can so modification its links to alternative devices often. Everyone should forward traffic unrelated to its own use, and thus be a router [2]. Congestion in replica allocation is a new challenge in MANET. The network congestion ends up in a reduction in outturn because of high load. The self-serving node is verified for the information packet drop. Then, the self-serving node is checked for false reporting; once the node misreports the information, its block listed [1,4]. This paper presents an efficient selfish node management (ESNM) method for MANET. This complete research paper is organized in various sections with covers selfishness and replica allocation in MANET, existing methods and challenges, proposed model and simulation results and comparisons.

II. SELFISHNESS & REPLICA ALLOCATION IN MANET

Selfish Nodes actively participate in route discovery, although not in packet forwarding [5]. They drop the info packets of others to preserve their energy such they're capable of transmitting a lot of amounts of their own packets and conjointly for the aim of reducing the latency of their packets. However, a mobile node might misdemeanor because of network congestion and selfishness. Node misdeed because of self-serving or malicious reasons or faulty nodes will considerably cut back the performance of MANETs [6]. The network congestion ends up in a reduction in outturn because of high load. The self-serving node is verified for the information packet drop. Then, the self-serving node is checked for false reporting; once the node misreports the information, its block list.

III. CHALLENGES IN EXISTING METHODS

A major drawback in MANETs is that the frequent incidence of network divisions because of the unlimited movement of the mobile nodes within the network. This leads to some information obtaining inaccessible to a number of the nodes [8]. Thus, information accessibility must be thought of rigorously in MANET [12]. Every mobile node in MANET needs the assistance of alternative nodes to forward the packets. The nodes area unit expected to attend for a pre-defined interval between sequential transmissions. However, a mobile node might act because of network congestion and selfishness. Node misconduct because of selfish or malicious reasons or faulty nodes will considerably scale back the performance of MANETs.

Existing method encounters with several issues such as -

1. Poor throughput
2. Less efficient
3. Higher packet drop rate
4. Lesser packet delivery rate

5. Poor selfish node detection
6. Poor replica allocation

IV. PROPOSED ESNM METHOD

Proposed **ESNM** mainly deals with MANET performance in duplicate allocation by effective replica allocation and congestion management. ESNM deals with passive congestion due to **"selfish node"** and active congestion due to **"overloading ".**The proposed ESNM method uses Watchdog method and IRTBDM for static congestion and IRED method dynamic congestion.

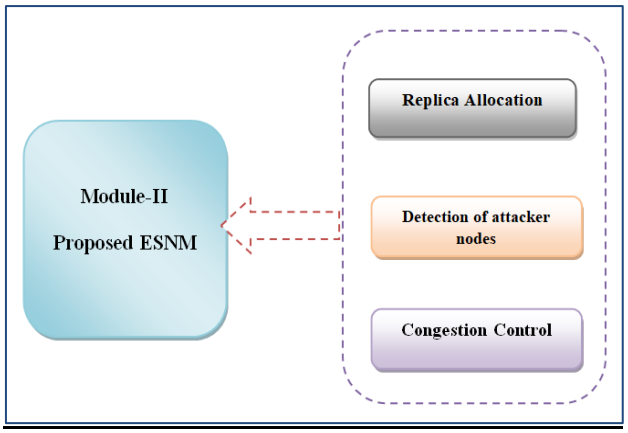


Figure 4.1 Proposed ESNM method for Phase-2

In a mobile ad-hoc network, congestion is one among the foremost necessary restrictions that deteriorate the performance of the total network. The proposed ESNM technique uses the Watchdog method with IRTBDM to cut back the congestion rate at the MANET. The proposed technique provides a higher packet delivery ratio, scale back packet drop ratio and communication overhead. These factors are necessary for MANET performance and reliability.

4.1 REPLICA ALLOCATION & ATTACKER NODE DETECTION BY ESNM- In MANETs, various types of DoS are also possible because of the inherent limitations of its routing protocols. A DoS attack always attempts to stop the victim from serving legitimate users. A DoS attack is an attack which relies on multiple compromised hosts in the network to attack the victim. There are two types of DoS attacks i.e. passive and active DoS attacks. The First type of DoS attack has the aim of attacking the victim node in order to drop some or all of the data packets sent to it for further forwarding even when no congestion occurs, which is known as **Passive DoS attack**[11]. The second type of DoS attack is based on a huge volume of attack traffic, which is known as an **Active DoS attack [10].**

4.1.1 PASSIVE CONGESTION DETECTION & CONTROL-This phase uses Watchdog [4,7]and IRTBD methods for passive congestion detection. One type of passive DoS attacks are selfish node attack in which node does not participate in network operation and it discard some or all of data packets sent to it without handling them properly even when no congestion occurs. We have explored the impression of selfish nodes in a MANET from the perspective of replica allocation and developed selfish node detection algorithm that considers the partial selfish node and fully selfish node as selfish replica allocation. The replica will be allocated using a specific SCF tree concept. Proposed ESNM method handles passive DoS attacks "selfish node attack" by effective node management. In passive Dos attack, a node does not participate in the network operation and it drops some or all the data packets like as congestion.

4.1.1.1 Watch Dog Method-The watchdog detection technique [7] is based on the indifferent acknowledgment of the relaying of packets by at variance nodes, by overhearing the send node's transmissions.

In this figure, the source node has established a multi-hop connection to the destination to transmit its data packets. The route has been established subsequent a multi-hop routing protocol. The data packets are then transmitted in a hop-by-hop fashion following the sequence source node to the precursor node to relay node to the successor node to destination node. In Figure.4.1.1.1, a packet is transmitted from the precursor node to the relay node. A packets buffer in the predecessor node keeps a temporary replica of the transmitted packets that have to be forwarded by the relay node. Each buffered packet is assigned a timeout inside which the packet has to be forwarded to the successor node by the sender node.

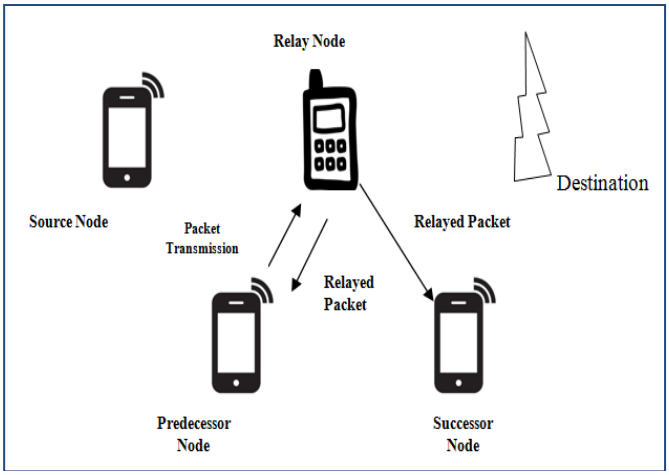


Figure 4.1.1.1 Working of Watch Dog Method

4.1.2 DYNAMIC CONGESTION DETECTION & CONTROL - An alarm will be raised based on the selfish behavior of overall nodes called overall selfishness alarm. But the alarm will also be initiated because of network disconnections too but it seems and treated as overall selfishness alarm, it will affect the overall performance of the network. Resource allocation for scheduling or congestion control is more involved for MANET than that of wired networks [19].

Proposed ESNM uses the following steps for active congestion-

Congestion can control by improvement by adding a priority queue, dynamic weight parameter during selfish node handling and replica allocation. A router accepts packets from various nodes present in the network and maintains them in a queue. If a feature of "range" is introduced. This can be elaborated as if a router can be provided with a predefined range, then the nodes which will come under that range only will be able to send the packets to that router.

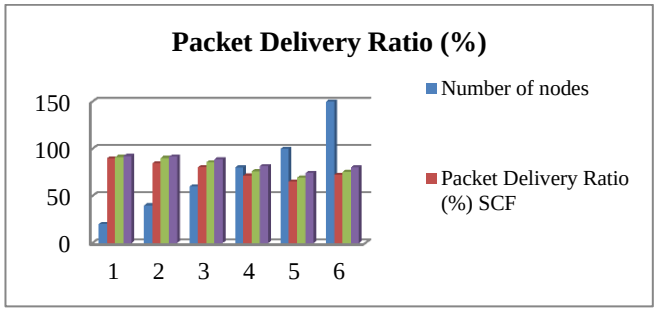
1. When the average queue length exceeds a minimum threshold (minth), packets are randomly dropped or marked with an explicit congestion notification (ECN) bit when the average queue length exceeds the maximum threshold (maxth), all packets are dropped or marked [4].
2. Queue length is a maximum size of the buffer in which packets are stored.
3. Minimum threshold (minth) is the value where the first notification is sent if queue length is crossed the min threshold blow min all the packets are forwarded without any packet drop.
4. Maximum threshold (maxth) is a value where all incoming packet is dropped if average queue length is crossed the maxthand if average queue length is between min and max threshold then packets will be dropped with maximum probability Pb.
5. We are introducing two parameters ESNM: minq and maxq, which are minimum and maximum numbers of packets that each flow is allowed to buffer with existing parameters.

In order to track the average per-active-flow buffer usage, ESNM maintains a count of buffer packets, qlen, and a count of times when the flow is not responsive (qlen > maxq).

V. SIMULATION & RESULTS COMPARISION

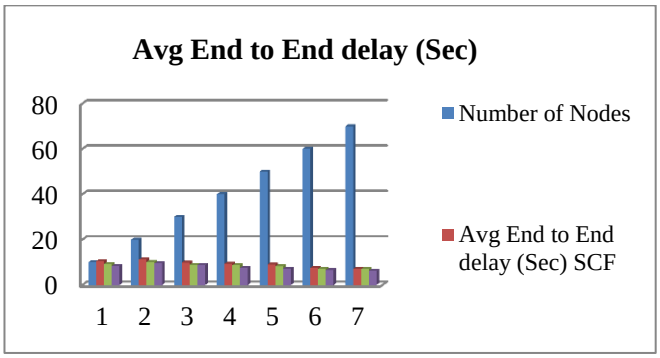
The scenario was simulated by using network simulator-2 (NS2) based on the network topology. The program was written in C++ and OTc1 programming language. Following Input and Output Parameter were used. These include the following parameters

5.1Packet Delivery Ratio (%) -The ratio between the number of packets that are received and the number of packets sent. **Packet Delivery Ratio (%) = ((Total number of Received Packet / Total Number of Send packet))* 100**



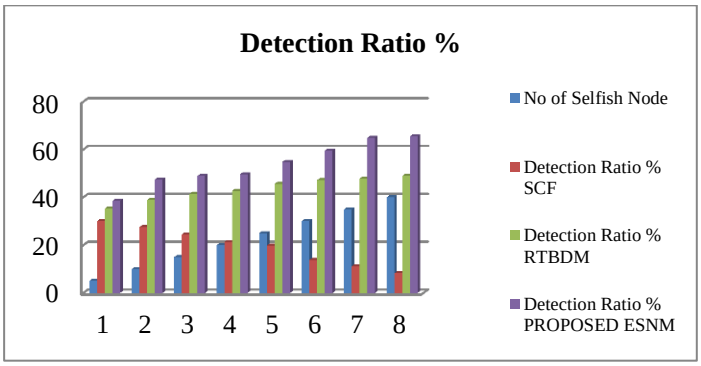
Graph 5.1 Packet Delivery Ratios (%)

5.2 Average End to End Delay- Average End to End Delay signifies the average time taken by packets to reach from one end to another end (Source to Destination). This delay includes processing and queuing delay in each intermediate node. Lesser end to end delay shows better performance of the networks.



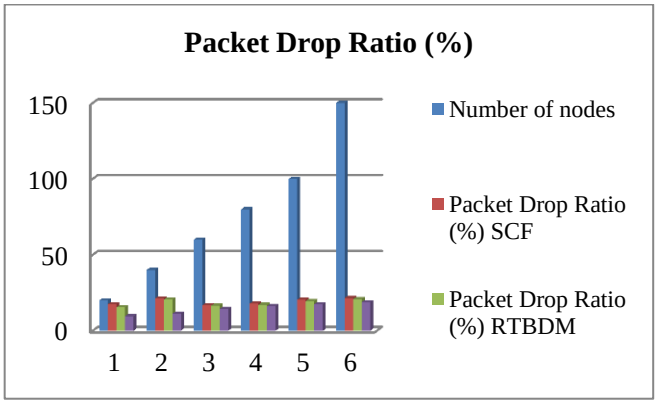
Graph 5.2 Average End to End Delays

5.3 Varying Number of Selfish Nodes or detection ratio– In this scenario, we are taking a static number of nodes in the network and show the effect of the network at varying selfish node in the network.



Graph 5.3 Varying Number of Selfish Nodes or detection ratio

5.4 Packet Drop Ratio (%)-Packet Drop is no. of packets dropped, sent from source to destination. The ratio between the number of packets that are dropped, and the number of packets sent. Lesser PDR % shows better performance of the networks.



Graph 5.4 Packet Drop Ratios (%)

5.5 Results Comparisons- Table 5.5 shows the performance comparison of the Existing and Proposed method. ESNM is the proposed method. In the table, 5.5 experimental results clearly influence that proposed ESNM gives the best performance of accessibility, and reduce the average query delay.

ALGORITHMS	PARAMETERS			
	Packet delivery ratio %	**Avg end to end delay**	**Selfish node detection ratio**	**packet drop ratio**
PROPOSED ESNM	Better	Better	Better	Better
RTBDM	Average	Average	Average	Average
SCF	Average	Average	Average	Average

VI. CONCLUSIONS & FUTURE WORKS

This research work was motivated by the fact that a selfish replica allocation could lead to overall poor data accessibility in a MANET. An efficient selfish node detection method and novel replica allocation technique are proposed to handle the selfish replica allocation suitably. This proposed method based on, Efficient Selfish Node Management Methods (ESNM) includes packet delivery ratio, packet drop ratio, average end to end delay, selfish node detection ratio and network traffic for proposed method various existing methods such as SCF and RTBDM. An experimental analysis of the research clearly shows that the proposed method ESNM shows better results over existing methods. In future work, we will compare the proposed method with more various existing methods in a real-time environment and check and compare their performances.

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