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Performance Analysis of Fault Identification and Recovery in MANET

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Abstract- **The collection of wireless mobile nodes creating a temporary network without the use of any fixed infrastructure or centralizes administration is known as Mobile Ad hoc Network (MANET) and which is playing a vital role in recent years. The different routing protocols of MANET's are modeled in Network Simulator-2(NS2) version NS-2.33 and is analyzed using routing protocols DSDV(i.e Proactive routing protocol) and AODV(i.e Reactive routing protocol).**

I. INTRODUCTION

Mobile Ad hoc network(MANET) is a technique of network where the collection of mobile nodes will take place and create a time being or temporary network without the use of fixed infrastructure or centralized administration. Wireless networks uses a type of radio. frequencies in air to transmit and receive information hence the reduction of physical link and also maintains cost. Recent days MANET is being an interesting topic because of 3G and 4G activities. MANETS are having multi hop connection for data transfer with topology change because of mobile station with automatic configuration ability[2]. MANETs are having the dynamic nature of routing strategy protocols which helps in providing efficient end to end data transfer or communication. A main challenge in creating MANET is establishing of dynamic routing protocols which helps in finding path between two nodes in a system[2],[3]. MANET's has been classified into three categories of routing protocols namely Proactive, Reactive and Hybrid[3]. In this paper performance analysis of two Mobile Ad-hoc routing protocols has been done they are DSDV and AODV.

II. BACKGROUND WORK

Identification of faults has been studied to a larger extent in case of wired network communication, but detection of faults in wireless network environment has seen more advance in a recent. Some of the techniques address the issues of stationary wireless network [4] [5]. So these techniques may not working for the dynamic approaches in MANETs, hence there is a tremendous need in resolving of these issues of dynamic wireless network.

The identification of the faults in MANETs goes basically in two categories: the first category addresses the faults in the wireless network MANET by considering one of the node as the host(or cluster head) and comparing the all other nodes to the host to determine the fault in the event. The host is considered to be fault free and this technique of approach was introduced in MANET by Chessa and Santi [6]. Since this approach focuses on determining of fault free host by monitoring and analysis thus they become inadequate methods for fault identification.

The second way of approach deals in identifying individual faulty nodes and links in MANETs. A temporal event-correlation technique for dynamic recognition of network topology was introduced by Natu and Sethi [7] [8]. Their approach constantly detects the conditions of hosts and end-to-end links between them by the correlations of measurements, through active probing of links.

A combinatorial approach and variance analysis to crrect failures in a network is used by Fecko and Steinder[9]. Probabilistic fault propagation model has been proposed by Cavalcante and Grajzer. Vashist et al. derived symptoms of faults by statistical analysis of network traffic measurements to detect network partitioning as well as faulty links and nodes in MANET [10].

SCENARIO DESCRIPTION

The proposed work is shown in figure.1. Initially creation of thirty nodes will be done, then transmission of data packets take place in the scenario. Later the faulty node will be detected in the system using low energy method. Then recovering of the node is also done in the system finally. This proposed work will be done by using Network Simulator-2 (NS2).

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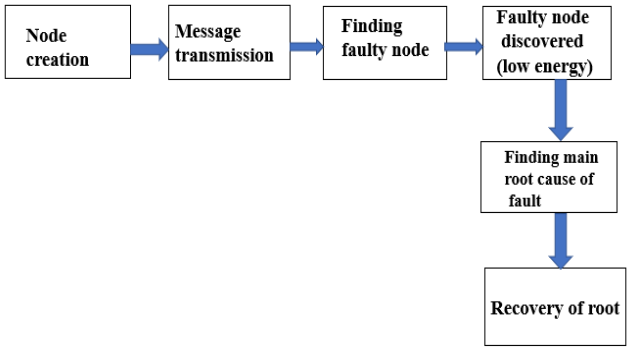

Fig.1. Block diagram of the project

The scenario shown below is created and analysed in Network Simulation-2. Network Simulator is a discrete occasion test system focused at systems administration research. Network Simulator gives significant help to simulation of TCP, routing, and multicast cost over wired and wireless communication. The simulation model is made up of 3 clusters and each cluster consists of 10 nodes.

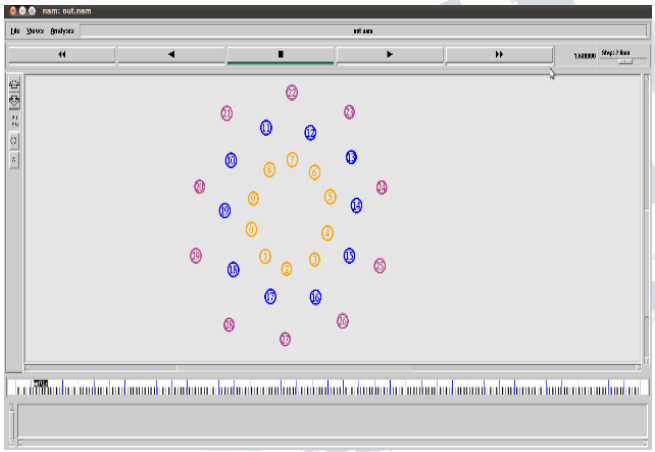

Fig.2. Thirty nodes creation in NAM

The shown simulation Fig.2. is observed in NS-2 NAM(output) window for creating 30 nodes. For both DSDV and AODV.

PROACTIVE ROUTING PROTOCOL

Proactive routing protocol is a type of mobile ad-hoc network. It also known as table-driven routing protocols. In this each and every node maintains routing information to every other node in the network. DSDV protocol need continuous update of routing table which use battery power even when network is idle. Proactive routing protocol is good for less number of nodes as the number of nodes increases it is difficult to update routing table all the time.

Fig.3. faulty nodes in (red colour) three cluster for DSDV

The Fig.3. shows NAM window for DSDV protocol. Here 40 seconds is simulation time. The thirty nodes are created and the hello packet has sent to all nodes and at eighteenth second data packets are transmitted to all nodes. At twenty first second the faulty node has been detected in network by using low energy methods.

Initially 50 Jules of energy is provided to all the thirty nodes. Then should define the threshold energy for nodes, if any of the node is having the energy less than the threshold energy after the transmission of data packets is detected as the faulty node in the network.

Here in the Fig.3, node 5, 14 and 27 are faulty nodes in the cluster 1,2, and 3 respectively. These faulty nodes are detected by the Low Energy method used in the paper.

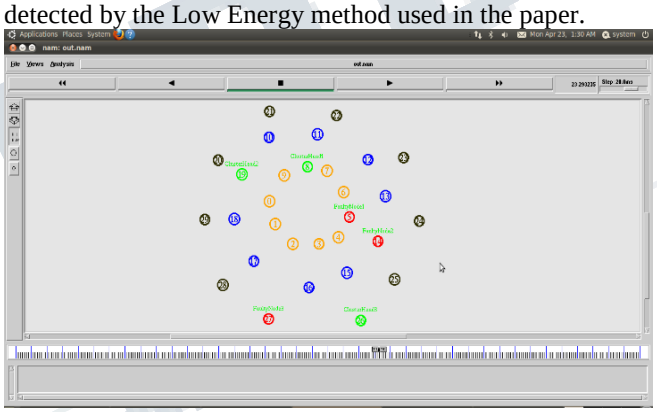

Fig.4. Detection of Cluster head (green in colour) in network (DSDV)

Fig.4 shows the cluster head nodes in network. Here node 8,19 and 26 are the cluster heads in network. The node which is having higher energy in the cluster is determined as the cluster head. Cluster head is determined at the twenty third second of the simulation time.

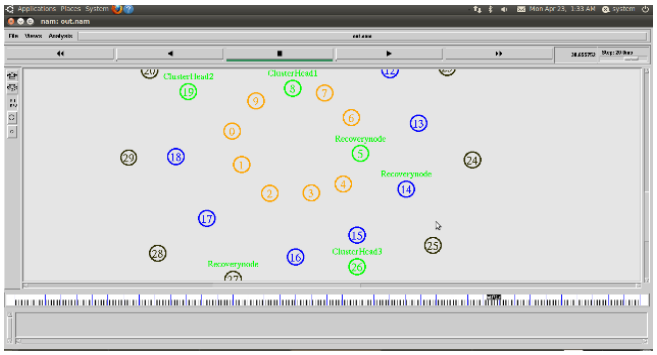

Fig.5. Recovering of nodes in DSDV.

The Fig.5. shows the recovering of the faulty nodes in the network. The faulty node is recovered by transmitting

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energy in cluster head to faulty node, at twenty ninth second the node is recovered. The simulation ends at 40th second.

REACTIVE ROUTING PROTOCOL

Reactive protocols find out routes only as necessary. When one node try to communicate with another node in the network, node checks the information which it is having for efficient route to the destination. If one exists, the node uses that route for communication with the destination node. It is suitable for communication when number of nodes increases. In this paper the AODV protocol has been used for the data transmission for reactive routing protocol. AODV is on demand routing protocol. Routes are established on demand and destination sequence numbers are used to find the latest route to the destination.

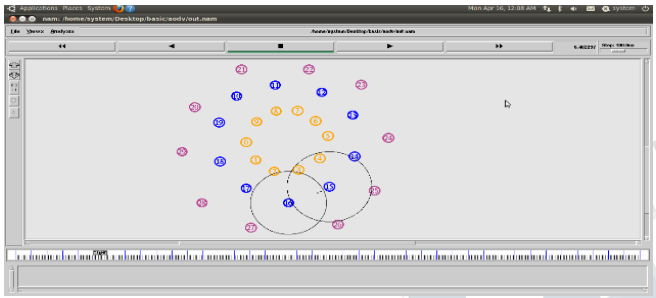

Fig.6. transmission of data packet in all nodes (AODV)

The Fig.6 shows the data packect transmission in all thirty nodes, here the data packet is moving from node fifteen to node sixteen.

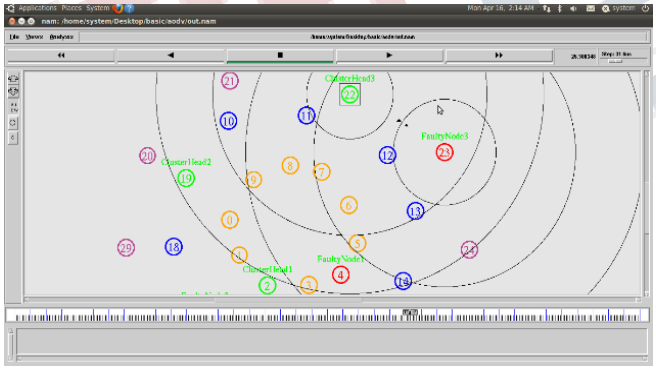

Fig.7. Determining faulty node and cluster head in network (AODV)

The above shown Fig.7. shows the identifying faulty node by using low energy method. And the cluster head in the network for AODV protocol by using highest energy of nodes in cluster. Here node 4, 17 and 23 are faulty nodes. Node 2, 19 and 22 are cluster head in each cluster respectively.

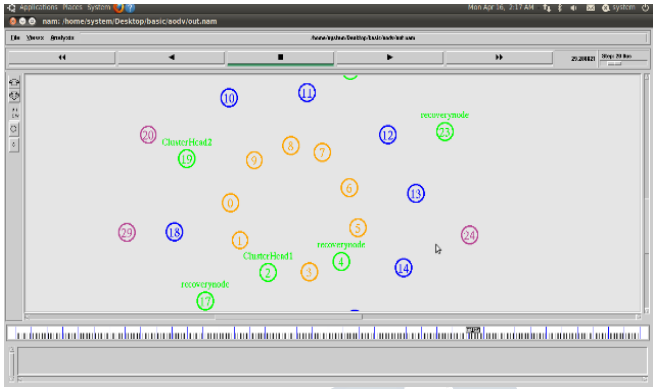

Fig.8. recovery of faulty nodes in network(AODV)

The Fig.8. shown above is for recovering of faulty nodes in the network for AODV . the faulty nodes are recovered by sending energy from cluster head to faulty node in each cluster.

SIMULATION PARAMETERS

For simulation, the mentioned character in table.1. has been used to establish scenario.

Table.1: Simulation Parameters

Channel	Wireless
MAC	IEEE 802.11
Antenna	Omni-antenna
Area size	500X500
Number of nodes	30 nodes
Routing protocol	DSDV, AODV
Simulation time	40 seconds val(stop)
Traffic source	CBR
Packet size	500
Energy model	50 Jules

III. CONCLUSION

MANET is good routing protocol for the communication. In this paper the two routing protocols of MANET like Proactive routing protocol and Reactive routing protocol are created in Network Simulation-2 (NS2) for DSDV and AODV. Data packets has transmitted to all thirty nodes, and faulty node is detected by using low energy method. And also Recovering of faulty nodes is done through cluster head in each three cluster (group of 10 nodes).

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