Propose and simulation of new approach for coordination of nodes

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Abstract: A Network is a combination of nodes and links. Nodes can be mobile and static in nature and links can be wired and wireless. so there can be different combination of network. In MANET [1][2] it is allowed for the mobile nodes to communicate with each other via a wireless medium without any infrastructure and forms a temporary network. Each node can take and receive data from another at the same time so node can be act as router as well as node at the same time. Each node can join the network with their own wish. Manet are facing various challenges i.e no central authority, different mobility models, battery power, Coordination of nodes .Continuously maintains the information required to properly route traffic. Coordination of nodes also plays important role in performance of Manet so this area must be concerned. Manet functions properly if the participating nodes never shows selfish behavior and shows cooperation and helps in proper routing of packets. Here in this paper we implements a new protocol for the coordination of nodes in Manet in NS2 simulator, In which no nodes will shows selfish behavior ,model would distribute the load among all the nodes so that no node will be over utilized and underutilized. Here network layer is taking DSR routing protocol and energy and path aware routing.

Keyword: Manet, DSR, CORE, SPRITE.

(I) INTRODUCTION (MANET)

As we know that a network is a combination of nodes and links .A node can be mobile and static in nature and similarly links are wire and wireless in nature. so we are having 4 different combination of network and MANET[1][2] is one of them. Because Manet is multi hop network so packets will be transfer from source node to destination node via different nodes. so the cooperation of these intermediate nodes is very much required to successfully transmission of packets. Battery power and bandwidth are very much imp part due to these low resources the owner of the nodes will not pass the packet to another node and shows the selfish behavior, but wants to use the other's resources, So a selfish behavior can be very much harmful for the complete network. There are many protocol has been designed by researchers for the cooperation of nodes in manet.

Cooperation Scheme in Manet

1. **Reputation Based**

- **First hand Re putation**
- **First hand and second hand Reputation.**

2. **Credit Based Scheme**

- **Virtual Bank usage**

1. <u>**Reputation Based Model:**</u>

<u>**CONFIDANT:**</u>

Bucheggar and LeBouded proposed a new protocol called as CONFIDANT[3]. This protocol was designed as an extension to an on-demand routing protocol such as DSR .In this protocol reputation is used to evaluate routing and forwarding behavior according to network protocol and trust is used to evaluate participation in protocol. This protocol facilitate monitoring and reporting for route establishment that avoid the misbehaving nodes. Packets of misbehaving node will not beforwarded by the fair node.

Confidant protocol mainly employs 4 main components on any node in network:

- A monitor
- Reputation record for first hand and trusted 2nd hand observation about routing and forwarding function of another node.
- Trust records to control the trust that is given to received warnings.
- Path manager to take routing decision that avoid malicious node.

Nodes monitor their neighbor and change reputation accordingly, a node can detect selfish behavior of next node in the source route either directly, by sensing the transmission of next node, or Indirectly by routing protocol misbehavior, monitoring component helping in this.

CORE:

This protocol[4] is also relies on on-demand routing protocol I.e DSR. This protocol was designed by Michiardi and Molva. In this protocol simulation of nodes collaboration through monitoring of the cooperativeness of nodes and reputation mechanism. A special function is use to combine the first and second hand experience. This function is then used by Watch dogs mechanism for other node behavior. In this protocol each node of network monitors the behavior of its neighbor node with respect to requested function and collect observation about the execution of that function. A Reputation table is use to record the observation by each node.

SORI:

This protocol[5] is basically focus on packet forwarding function and it is secure and reputation based scheme for adhoc network.

Their are 3 basic component of this protocol:

1.Neighboring monitoring
2.Reputation propagation
3.Punishment

A node must be capable of overhearing the transmission of its neighboring node to maintain a neighbor node list. here each neighbor forwarding is linked with 2 parameters:

$Rfn(X)$:-indicate the total no of packets that node n has transmitted to X for forwarding.
$Hfn(X)$:-total no of packets that has been forwarded by X and notice by n.
so basically combination of these 2 parameters are necessary to check the reputation of nodes in SORI.[6]

OCEAN:

The Observation based Cooperation Enforcement in adhoc network. This protocol introduce an intermediate layer between the network and mac layer. The main purpose of this layer to help in intelligent routing and forwarding decision. It uses only first hand observation. here each node maintains a rating for each neighboring node and monitor their behavior through observation.

2. CREDIT BASED MODEL:

SPRITE:

It[7] uses a centralize credit clearance service(CCS). A When receiving a packet,a node keep the signed receipt of this packet,which was generated by source node. when a node sends its own packet,it loses a credit(virtual currency) ,because the other node incur a cost to forward these packets. In order to gain a credit and be able to send packets later,a node must forward packets on behalf of other. CCS charges the sender based on the no of receipt,the no of intermediate nodes left to reach the destination.
A potential disadvantage of of Sprite is the assumption that a fast connection to the CCS is needed for the reporting of the obtained receipt. An extension of the basic sprite provides integrity during packet exchange and is based on digital signature.

Token Based CooperationEnforcement:

It[8] is self organized without assuming any a-priori trust between the nodes or the existence of any centralize trust entity. The scheme is fully localized and its credit based strategy produced overhead that is significantly decreased

when a network is not harmed. The system's secret key is shared among the network node and each node maintains limited portion or it. each node carries a token, signed with a system's secret key as derived from the threshold cryptography process. This scheme includes 4 components:

1. Neighbors verification
2. Neighbors monitoring
3. Intrusion reaction
4. Security enhanced routing protocol

I decide to implement a protocol which avoids selfishness as well as congestion in the network. We implement a new selfishness avoiding technique which is based on load balancing. Each node in the network use the resources equally and equally distributed the services among all the nodes in the network.

(II)   Protocol And System Model

Nodes are using path and energy aware routing protocol. The main goal is to find the shortest path between source and destination when it is feasible. The nodes which are showing selfish behavior will not be able to send its own packet. A small amount is memory is maintained by each node to maintain a signed integer called credit. This credit is used to show that whether the node is selfish or not. If a node is selfish then it can not send its own packet. A node is called as selfish if its credit is less than some predefined limit . The punishment of selfish node is that he can not send its own packet so this type of punishment will motivate them not to be selfish.

The transmission power of every node is equal initially. when a node send its packet to some intermediate node then that intermediate node send an ACK to conform that packet has been forwarded.

ALGORITHM:

1. When a node send a packet to next node if the reply will come from the receiver node to sender node then credit will be decrease of sender node.
2. Because packet is drop by any selfish node then in that case the credit of all node from where this packet has came will be given back;
3. A node must have minimum 3 credit to send it own packet;
4. To forward a packet there is no minimum criteria of having credit with any node.
5. When a node forward the packet then its credit will be increase by 1 i.e. credit=credit+1;
6. When a node send its credit will be decrease by 1 i.e. credit=credit-1;
7. If a node having credit less than 3 we assume that it is a selfish node.
8. Punishment : The only punishment is that its credit will be decrease by 1 if any node do not forward the packet.
9. When a node is willing to send the packet but its credit is less than 3 then this node can tell the other node to give this node some packet to forward.
10. When a node send a packet to its neighbor node to forward if that node is not able to forward then the route will be diverted to some other path means other route will be choosen.

SIMULATION: For the purpose of implementation we have used NS2 (Network Simulator) .NS2 is event driven simulator. Front end language for ns2 is tcl (tool command language) and back end language is C++. and in the simulator we have done the   complete implementation of the new protocol and show the results via graphs I.e throughput ,packet delivery ratio, and energy efficiency.

Table1: Parameter Table:

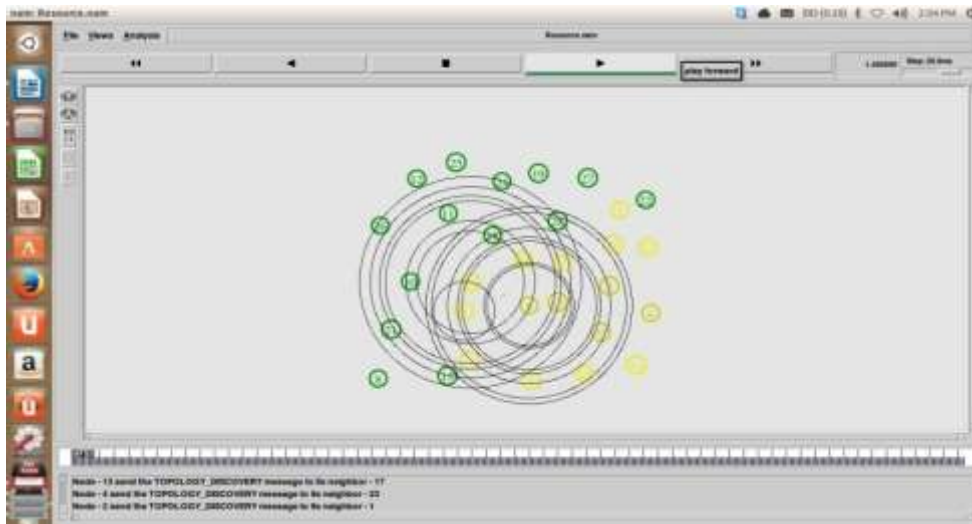| Properties	Values
Antenna	Omni directional
Channel	Wireless
Routing Protocol	DSR
Radio Propagation Mode	Two Ray Ground
Initial Energy(joules)	100
Area	710X710
Initial credit of nodes	3

(III)   Results and Future Scope

Fig 1: Sending Request to find route between source and destination node
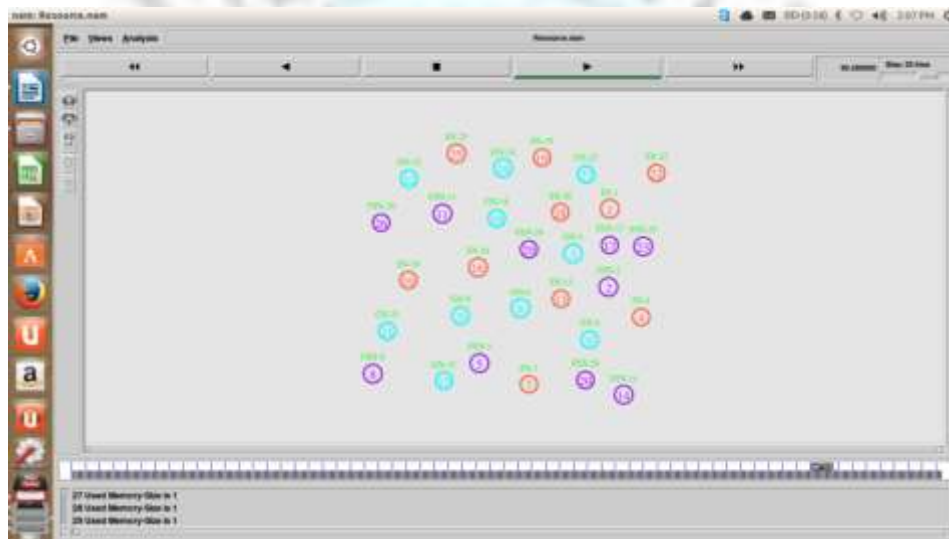

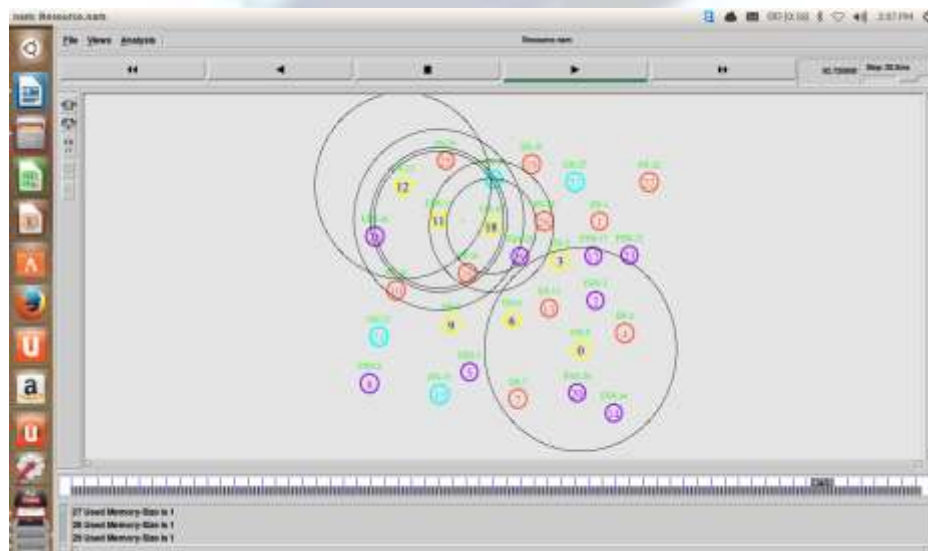Fig 2: System find all the selfishness and good nodes(non selfish node)

Fig 3: Actual data transmission between source and destination via good nodes
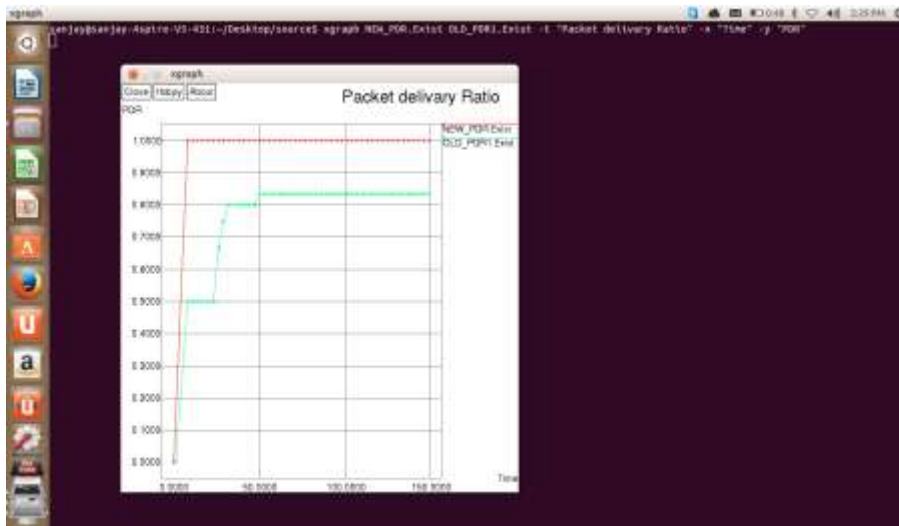
Packet Delivery Graph:
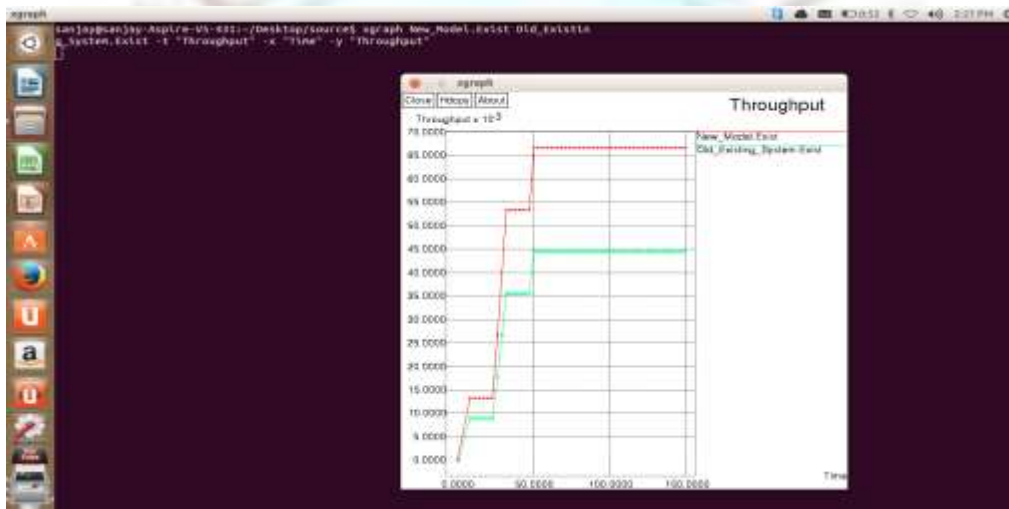

Fig: 4 Packet Delivery Graph

Throughput Graph:
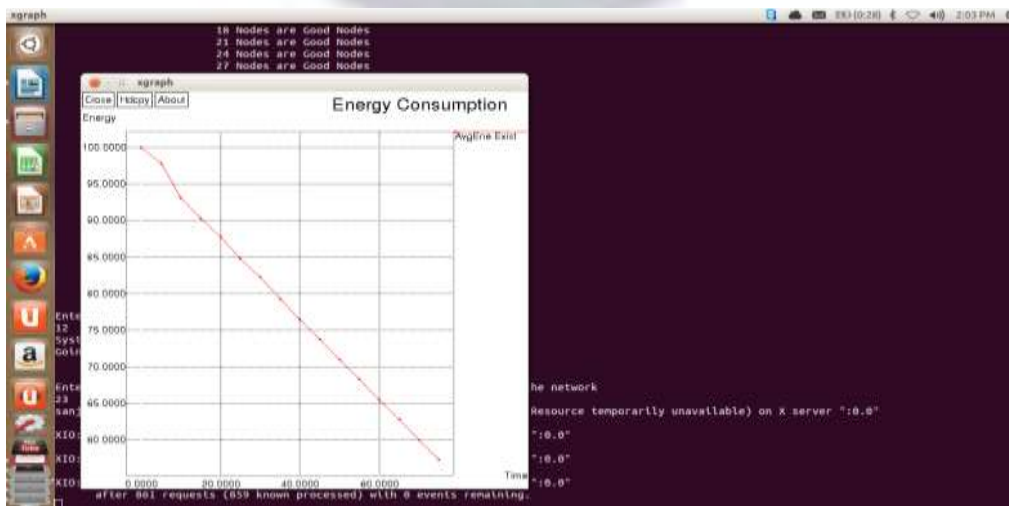

Fig: 5   Throughput Graph

Energy Consumption Graph:

Fig: 6: energy consumption graph

Table 2: Comparison table

Parameter	Old_system	New_system
Throughput	Not much better	Better than old system
Packet delivery ratio	Not good	Good
Energy consumption	Not defined	decrease with time

(IV)   Future Work

After analyzing the table2 and graph of throughput and packet delivery ratio, we can conclude that our new implemented system is better and can be use easily because congestion and selfishness can easily be reduced by using this system. In the future students and researchers can apply different scheme in different scenario and they can also apply different another scheme like punishment scheme and memory detail so to get some better results, and also can do changes in algorithm to get some better results.

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