

Detection of Routing Misbehavior Nodes Using Improved 2-ACK in MANET'S (Simulation through NS-2)

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Abstract: A MANET (mobile ad hoc network) is a collection of individual mobile nodes which communicate with each other via wireless link. In some cases the node which refuses to share its resources with the other for its own benefits are called selfish or misbehaving nodes. Because of these nodes in MANETS performance of the network gets effected like scarcely available battery-based energy and node misbehaviours may exist. In this paper we use improved 2ACK scheme is used to identify these misbehaving nodes in MANETS. It sends two-hop acknowledgement packets in opposite side of the routing path. Here we will be using the AODV (Ad Hoc On-Distance Vector Routing) protocol. The proposed improved 2ACK scheme also reduces the overhead of ack's caused by 2ACK scheme (older version).

Keywords – Ad Hoc On-Demand Vector Routing (AODV) Routing, Mobile Ad Hoc Networks (MANET), Node misbehavior, routing misbehavior .

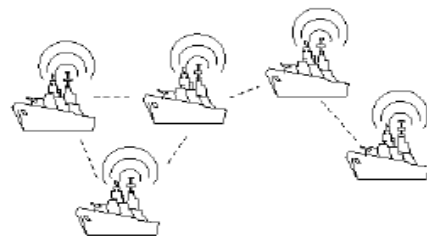
I. INTRODUCTION:

In a mobile network (wireless), a node can easily enter into it and cause a mesh confusion as there are no dedicated path or authority for routing, forwarding the packets, authentication etc thus becoming a big issue for security. This is a major problem in all wireless networks. Also the node often moves from one location to another which leads to unnecessary routing overhead. The best example is Bluetooth. In our project we mainly deal with the misbehaving nodes in MANETS. Although they have sufficient battery power etc these nodes do not share or transfer the data to the other node for their own benefits. Thus there may be loss of the data when the misbehaving node drops the packet. In such cases we use improved 2ACK scheme with AODV to identify these misbehaving nodes. We have different types of MANETS. Let's have a look at them

1.1 TYPES OF MANETS

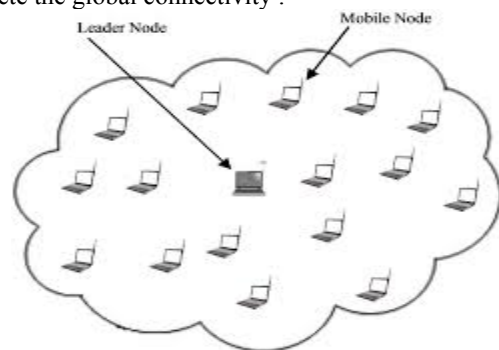
Closed MANETS:

In this closed MANET all the mobile nodes will be together and cooperate with each other towards a same or common goal and works on it. Examples such as emergency search/rescue, military, law enforcement operation etc.



Open MANETS :

This is completely opposite to the closed MANET. In this different nodes with different goals share their resources to complete the global connectivity .



2. EXISTED SYSTEM :

Detecting misbehaving nodes in MANETS was proved by using improved 2ACK scheme in DSR protocol. Initially DSR uses watchdog and pathrater algorithms to detect the misbehaving nodes. But the watchdog algorithm has its own limitations like it can not detect the misbehaving nodes in the presence of ambiguous collisions, receiver collisions, limited transmission power, false misbehavior, collusion and partial dropping. To overcome this DSR used 2ACK scheme. The main drawback in this 2ACK is that due to acknowledgements overhead is increased and to reduce that we use improved 2ACK which depends on 2ACK but reduces the acknowledgements.

2.1 DYNAMIC SOURCE ROUTING :

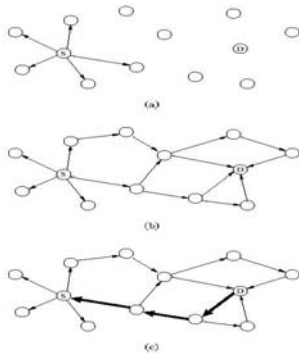
DSR routing protocol is a reactive protocol and it is mainly designed for use in multi-hop wireless ad hoc networks of mobile nodes. It helps nodes in self organizing and self configuring. It involves two steps

A.Route Discovery :

In order to identify the route packet is sent from the source to destination where the packet doesn't know the path already. Once it reaches the destination the path is discovered.

B.Route Maintenance:

In this case, once the route is discovered it will be maintained until the route is not broken or damaged. If the route is broken then the source can make attempt to find for another route for destination. The route discovery and the route maintenance are completely on demand.



In the above figure ,

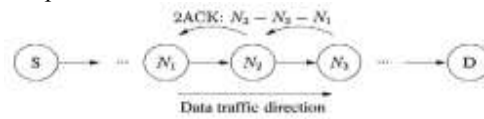
- 1) Source(S) sends the route request
- 2) Then the request is forwarded, adding their address and developing the route.
- 3) Destination (D) returns the route reply packet using the route developed in the route request packet or it can discover its own route back.
- 4) S caches multiple paths from destination later.

2.2 2ACK SCHEME :

This scheme is mainly used to detect the misbehavior routing and confidentiality of the data in MANET'S. It is as follows

- Using 2ACK if the time required for sending data is less than the wait time and intermediate node contains same message as original, the sender is massaged that the link is working properly.
- Using 2ACK if the time required for sending data is more than the wait time and intermediate node contains same message as original, the sender is massaged that the link is misbehaving.
- Using 2ACK if the time required for sending data is more than the wait time and intermediate node doesn't contain same message as original, the sender is massaged that the link is misbehaving and confidentiality is lost.
- Using 2ACK if the time required for sending data is less than wait time and intermediate node doesn't contain same message as original, the sender is working properly and confidentiality is lost.

Confidentiality of the message will be verified as, the destination will be generating the hash code which is compared with the sender's hash code.



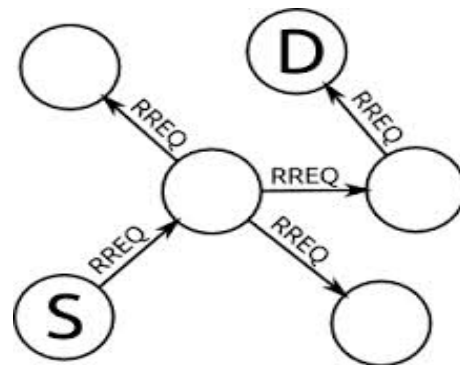
The figure illustrates the 2ACK scheme. Consider three consecutive nodes N1, N2 and N3 along a route. N1 sends a data packet to N2 and N2 forwards it to N3, it is unclear to N1 whether N3 receives the data packet successfully or not. Such an ambiguity exists even when there are no misbehaving nodes. On the successful reception of the data packet ID, N3 sends explicit acknowledgment to N1 for its notification in 2ACK scheme. Node N3 sends 2ACK packets in opposite direction to N1 after successful reception of data packets. Hence triplet [N1 → N2 → N3] is formed from the original data traffic route where N1, observing node checks the link N2 → N3. In 2ACK scheme, data transmitted through the triplet along the route where any node can be acts as a sender or receiver.

3.PROPOSED SYSTEM :

Here we will be using the 2ACK and the improved 2ACK schemes with AODV routing protocol to find out the misbehaving nodes.

3.1 AODV(AD HOC ON- DEMAND VECTOR) ROUTING PROTOCOL :

This routing protocol is an on demand protocol. In order to identify the most recent routes it employs the destination sequence numbers. The main difference between the Dynamic Source Routing and AODV is that DSR uses source routing in which a data packet carries the complete path to be traversed and in AODV, the source node and the intermediate nodes store the next-hop information corresponding to each flow for data packet transmission.



In the above figure source generates the route request packet and is sent to all the near by nodes until it reaches to its destination and find out the route. It uses the destination sequence number to determine the up-to-date path to the destination.

3.2 IMPROVED 2ACK SCHEME:

The improved 2ACK uses the concept of the 2ACK scheme and depends on it .But in this improved version of 2Ack scheme it reduces the number of ACK and detects which node is exactly misbehaving in the triplet(three consecutive nodes).

A.Working Of Improved 2-ACK Scheme :

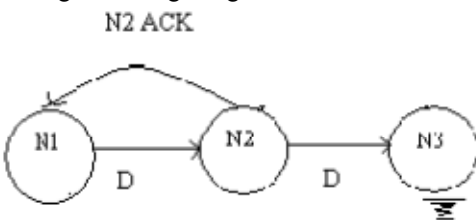
1)Best case :

Here let’s assume that there is no misbehaving in the triplet.Suppose that the time taken be T_M is required to send the packet and receive ACK between 2 consecutive nodes.The packet will be sent by N1 to N2 and will be forwarded by N2 to N3. Then N3 will send ACK in reverse path (i.e. $N3 \rightarrow N2 \rightarrow N1$) Here N2 will not send its own ACK to N1.



2)When N3 Misbehaved :

In this case let us assume that node N3 is misbehaving (i.e it may drop the packet or will not send the ACK).Here N2 will wait for N3’s ACK for time T_M and if it is not getting then N2 will send its own ACK to N1 which informs N1 that N3 is misbehaving as N1 is getting ACK of N2 and not of N3.



3)Worst Case :

Suppose N2 misbehaves (i.e. Either N2 drops the packet or it drops ACK sent by N3). In both cases N2 can’t send ACK to N1 which will inform N1 after time $2T_M$ (time starts from packet sent from N1 to N2) N2 is misbehaving.

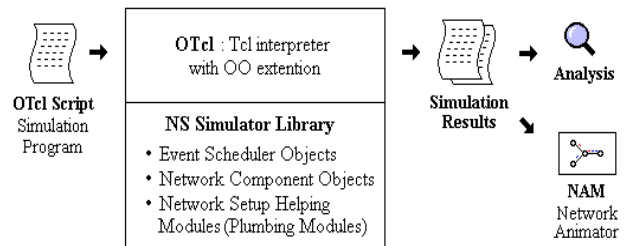


B. Advantages of Improved 2ACK Scheme :

It solves all the limitations of watchdog and pathrater.That isambiguous collisions,receiver collisions and limited transmission poweretc.

4.SIMULATION ENVIRONMENT :

In our project we are using NS2 (NETWOERK SIMULATOR VERSION 2) .NS2 is an object oriented,discrete event driven .It was developed at UC Berkely written in C++ and OTcl languages.It is very very useful for simulatory local and wide area networks.A simulator is a program or dedicated device which models some of the aspects of real life in an effective and controlled environment. A Network Animator(NAM) is also used and it is an animation tool which is compatible with NS2.



From the above figure we can say it is a simplifies user’s view , NS is Object-oriented Tcl (OTcl) script interpreter that has a simulation event scheduler and network component object libraries, and network setup (plumbing) module libraries (actually, plumbing modules are implemented as member functions of the base simulator object).

5.CONCLUSION :

This Improved 2 ACK scheme is better than previous 2ACK scheme as it reduces the acknowledgement and also display exactly misbehaved node. This scheme also reduced the number of ACK when it acts in best case without delay as it sent acknowledgement within time. There are various other routing schemes to implement the improved2ACK scheme.But here AODV is used as a basic protocol for implementing the improved 2ack scheme. The main challenge is how to derive the information so that the improved 2ACK sender and the observing node are informed of such information

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