SECURE PACKET TRANSFER USING CLUSTERING TECHNIQUE IN MULTIPATH ROUTING IN MANET

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***Abstract*:**
Mobile Ad hoc networks are formed dynamically by an autonomous system of mobile nodes that are connected through wireless links. Network topology can be frequently changed due to dynamic nature. Each node can acts as a router while transmitting data over the network. In this paper, network based clustering techniques are used to discover a route in a secured way by sending route request to the destination with digital signature in a network. The results show that, the packet transfer in multipath routing can be secured in MANET.

***Keywords*:**
Routing, Clustering, Cluster Head, Packet Transmission, Digital Signature

1. INTRODUCTION

The five major security goals in Mobile ad-hoc networks are to provide a security service which includes confidentiality, availability, authentication, integrity and non-repudiation. Each mobile node in ad hoc networks may function as a router and forward packets for other peer nodes. In mobile ad-hoc networks, the issue of transferring packets between nodes within the network is a challenging task because the nodes can move randomly anywhere due to frequently change.

2. RELATED WORK

Brill et al. [1] explored the effectiveness of numerous mobile ad hoc network routing protocols. The authors utilized DSDV and AODV as their bases because these are the two very usual used protocols in proactive and reactive routing, respectively. The authors distinguished these to Ant Hoc Net's effectiveness of ant colony optimization execution. This protocol acts as a hybrid protocol, which uses reactive and proactive components. The authors presented their discoveries by implementing simulations in numerous visions based on the NS2 network simulator.

A.K.Sharma et.al [2] proposed a group of mobile devices linked wirelessly to a self-configured, self-healing network in the absence of immutable infrastructure. MANET devices are free to move approximately when network topology alters regularly. Each device acts as a router when sending traffic to a specific tool in the network. MANETs can function as a whole, or they can be part of a more extensive web. They create a more energy independent topography because there are one or more various transceivers between the devices.

The clustering and cluster head chosen techniques available on the MANET include location-based, motion-based, neighbourhood, power, and weight-based clustering. These techniques have overhead due to high cluster numbers, limited device coverage and device energy waste. The path selection process is named routing in networks. In MANET, each device determines the shortest way to send messages between the other nodes. There are two kinds of routing protocols in MANET. These are proactive routing protocols and reactive routing protocols.

Muratchaev et al. [4] proposed an analysis of feasible ways to use clustering techniques to resolve issues in MANET's routing networks. A comprehensive study of the problems of MANET networks executed, accompanied by the feasibility of determining them based on clustering using neural networks. Particular executions of cluster algorithms for routing application presented using a multidimensional choice of network parameters. It is feasible to utilize these techniques in traditional routing protocols, for example, OLSR and AODV.

Clustering separates the entire network into smaller subgroups called clusters [5]. Thus clustering creates the extensive network will appear smaller and with low dynamic. Various mobile devices in a typical cluster assign different status or functionality such as cluster head, cluster gateway and cluster member. MANET is an ad hoc network where the nodes involved in the network have the same communication range [6]. Ad hoc networks suffer from a lot of limitations when compared to wired networks [7]. Routing packets to longer destinations involve multiple hops and route discovery as part of their network activities. It is essential that the adjoining nodes coordinate with each other to carry out the successful transmission of data. Clustering techniques combined with a suitable routing algorithm can greatly improve the packet delivery ratio in CEAACK MANETs [8]. In this approach, the trusted nodes are identified using filtering technique for efficient data

transmission [9]. Wireless networks need a lot of security measures and selecting a suitable and efficient cryptographic algorithm is very essential to achieve this [6-9]. Cryptographic algorithms may be symmetric or asymmetric based on the key selection strategy employed [6,10].

3. RESULT & DISCUSSION

3.1 Clustering Technique

The Mobile ad hoc network is divided into cluster and each cluster has its own Cluster Head (CH). There are different number of parameters are used to elect the cluster head. This technique elects cluster-head based on its weight with set of parameters like trust value, energy consumption of nodes, stability etc. Cluster-head acts as a local coordinator for each cluster and makes transfers inside its cluster. Cluster-member is the non-cluster-head device that makes cluster transmissions. A node id is assigned to each node by using Random number Generator.

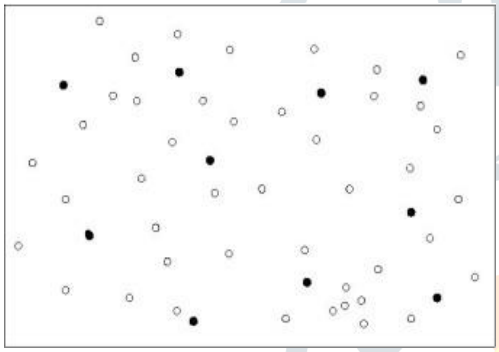

Fig.1 Identification of Cluster Head

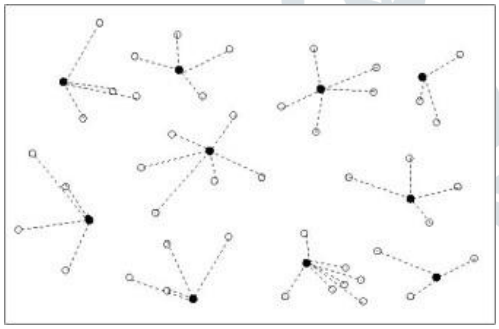

Fig.2 Clusters formation

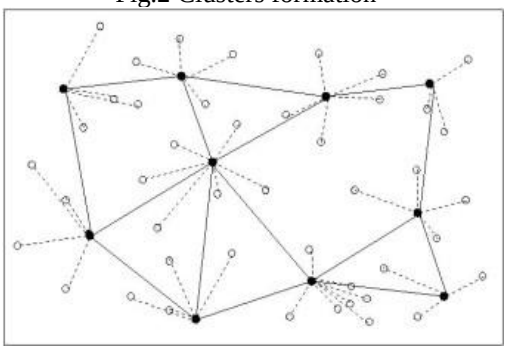

Fig.3 Clusters connection

3.2 Cluster Head Election Criteria

Trust value (T): The trust value in cluster based is used to detect the malicious node in cluster.

Node Connectivity (C): The number of nodes can communicate directly with its neighbor node.

Battery power (b): Energy consumption plays a vital role to select Cluster Head. Efficient use of battery power is essential in order to establish a long term connection between any nodes in the network.

Max Value (M): It defines a number of nodes that a cluster can handle within the cluster.

Stability (S): This is the main parameter to decide the cluster head. The steady node elect as a cluster head of cluster. The stable and reliable route is needed for the uninterrupted communication with in the Network.

***Average distance*:** It shows the average distance between node A and all its neighbors. *N* is the degree of A when *AD* = 2, (i.e) the majority of neighbors are within 2 hops.

***Global Weight Factor*:** Weight factor also plays a very important role to decide the cluster head. Weights are assigned to nodes such that their summation is unity which is calculated by using all the above parameters.

$$G_W(i) = [G_t(i)*F_t(i)+G_{nc}(i)*F_{nc}(i)+G_{bp}(i)*F_{bp}(i)+G_{mv}(i)+F_{mv}(i)+G_s(i)+F_s(i)]$$

A. ***Cluster and Cluster Head Creation in MANET***

Step-I

Assign Node Id for each node
for (i=0; i<N; i++)
{
Node Id[i] =Random No Generator ( );
} /*Random No Generator generate different random Node id for each node in MANET */

STEP-II Cluster Creation ( )

{
Total No of Node=N;
for (i=0; i<N;
i++)
{
Each node sends a route request message to its Neighbor node
} /* each node builds neighbor list based on Route request Message*/
}
int Max Value,
Min Value; for
(i=0; i<n; i++)
{
if (No of node in Cluster< Max_value)
{
join cluster( );
}
if(No of node in Cluster>=Max_value)
{
Create new cluster();
}

STEP-III Cluster Head Election criteria

Total No of Node=n;
for(i=0; i<n; i++)
{
/*Assign Weight for each node in such a way summation of all weight is unity*/
G_t [i]={}; /*Partial Weight factor for belief value*/
G_{nc}[i]={};/*Partial Weight factor for node

connectivity*/ G_{bp}[i]={}; /*Partial Weight factor **for Battery */**
G_{mv}[i]={}; /*Partial Weight factor for Max value*/
G_s[i]={}; /*Partial Weight factor for Stability*/
/*Take all value from table which is created on the bases of Route request Message by each node*/
F_{tv}[i]= {}; /* Belief value*/
F_{nc}[i]={}; /* Connectivity*/
F_{bp}[i]={}; /* Battery power*/
F_{mv}[i]={}; /* Max value*/
F_s[i]={}; /* Stability*/
/calculate Global Weight for each Node/
} Find out minimum Global Weight in Cluster and assign as Cluster Head (CH);
}

STEP-IV Newly Arriving Node in MANET

If (New node global Weight <Cluster Head)
{
Assign New node as a Cluster head;
}
else
{
Join Cluster();
}

STEP-V Threshold of battery Power

Check the battery power of Cluster Head If (CH_battery Power< Threshold)
CH sends Battery power low Signal to Its Neighbor and recalculate the Global weight for each node and Minimum global weight node assign as Cluster Head
else
{
No requirement;
}

3.3 Routes Discovery:

Step 1: Source node generates Route Request with its id & destination id added with Digital Signature.
Step 2: Source node sends Route Request to Cluster Head
Step 3: WHILE (Cluster Head checks Destination is unavailable in own Cluster)
Step 4: Cluster Head add its Id with Digital Signature to Route Request
Step 5: Cluster Head forwards Route Request to another Cluster Head
Step 6: End For
Step 7: End WHILE
Step 8: Cluster Head Collects all ids from Route Request, also generates Route Reply and its id with Digital Signature added
Step 9: Cluster Head sends Route Request to Source.
Step10: Source collects routes from Route Reply.

4. CONCLUSION

In this paper, packet can be secured while transferring from source to destination in the network. The Clustering techniques provide security to the route discovery and route maintenance phase.

Thus to conclude, work may be done in this problem by using different clustering algorithms that may be better suitable for the MANET in future.

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