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A Review on DSDV and PSO Routing Protocols for Ad-hoc Network

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***Abstract*—A Mobile ad hoc network is a group of wireless mobile computers (or nodes) in which nodes are collaborated by forwarding packets to allow them to communicate outside the range of direct wireless transmission. In this paper, we are finding the shortest network path essential routing data packets through the shortest path. PSO is also inspired by behavior of swarm of fishes or flocks of birds to find a good food place. This paper is for evaluation of AODV (Ad-hoc on demand distance vector) and DSDV (Destination sequence distance vector) and PSO routing protocols' performance on the basis of different criteria for performance.**

***Index Terms*— AODV, DSDV, DSR, PSO.**

I. INTRODUCTION

Ad hoc is used to describe solutions that are developed on-the-fly for a specific purpose. In computer networking, an ad hoc network refers Wireless base station to a network connection established for a single session and does not require a router or a For example, if you need to transfer a file to your friend's laptop, you might create an ad- hoc network between your computer and his laptop to transfer the file. A wireless ad hoc network is a decentralized wireless network where the network does not depend on a pre existing infrastructure, such as routers in wired networks or access points (AP) in managed (infrastructure) wireless networks. Instead, each node participates in routing by forwarding data to the other nodes, and so the determination of which nodes forward data is made dynamically i.e. the normal nodes is converted to a routers and gateways [8].

II. MANET

A Mobile ad hoc network is a group of wireless mobile computers (or nodes). In which nodes collaborate by forwarding packets for each other to allow them to communicate outside range of direct wireless transmission. A MANET is an autonomous group of mobile users that communicate over reasonably slow wireless links. The network topology may vary rapidly and unpredictably over time, because the nodes are mobile. The network is decentralized, where all network activity, including discovering the topology and delivering messages must be executed by the nodes themselves. Hence routing functionality will have to be incorporated into the mobile nodes.

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A. Characteristics of MANET

Mobile ad hoc network nodes are furnished with wireless transmitters and receivers using [7] antennas, which may be highly directional (point-to-point), Omni directional (broadcast), probably steer able, At a given point in time, depending on positions of nodes, their transmitter and receiver coverage patterns.The characteristics of these networks are as follows:

- Communication via wireless means.
- Nodes can perform the roles of both hosts and routers.
- Bandwidth-constrained, variable capacity links.
- Limited Physical Security.
- Dynamic network topology.

III. ROUTING PROTOCOL

Classification of routing protocols in mobile ad hoc network can be done in many ways, but most of these are done depending on routing strategy and network structure. The routing protocols can be categorized as flat routing, hierarchical routing and geographic position assisted routing while depending on the network structure

A. Ad-hoc On Demand Distance Vector Routing (AODV)

Ad hoc On-Demand Distance Vector (AODV) routing is a routing protocol for mobile ad-hoc networks and other wireless ad-hoc networks.. It is an on-demand and distance-vector routing protocol, meaning that a route is established by AODV from a destination only on demand. AODV is capable of both uncast and multicast routing. It keeps these routes as long as they are desirable by the sources. Additionally, AODV creates trees which connect multicast group members..

B. Characteristics of AODV

- Uncast, Broadcast, and Multicast communication.
- On-demand route establishment with small delay.
- Multicast trees connecting group members maintained for lifetime of multicast group.
- Link breakages in active routes efficiently repaired and all routes are loop-free through use of sequence numbers.

C. Dynamic Source Routing (DSR)

Dynamic Source Routing (DSR) is a routing protocol for wireless mesh networks. It is similar to AODV in that it establishes a route on-demand when a transmitting mobile node requests one. However, it uses source routing instead of relying on the routing table at each intermediate device. Dynamic source routing protocol (DSR) is an on-demand, source routing protocol, whereby all the routing information is maintained (continually updated) at mobile nodes. DSR allows the network to be completely self-organizing and self-configuring, without the need for any existing network infrastructure or administration.

D. DSDV Protocol: Destination Sequenced Distance Vector (DSDV) Protocol

Proactive Routing: DSDV (Destination Sequence Distance Vector Routing) The DSDV is one of the first protocols proposed for wireless Ad Hoc Networks. It is an enhanced version of the distributed Bellman-Ford Algorithm, wherein each node maintains a table that contains the minimum distance and the first node on the shortest path to every destination node in the network. The Table updates are done with increasing sequence number tags in order to prevent loops, to deal with count-to-infinity problem, and for faster convergence The mechanism of Eff -DSDV is explained by the following way: If the next hop link of Host A for the required destination is active, then it uses the conventional DSDV Protocol. In case if any outgoing link breaks, and if there is no capacity in the buffer, then the incoming packet is discarded. Otherwise the packet is buffered for later transmission.

IV. PARTICLE SWARM OPTIMIZATION

The effective transmission of packets is a requirement for the provision of advanced communication performance makes finding shortest network paths essential. Routing data packets through the shortest path

(SP) is an efficient approach to increase the Quality of Service (QoS) in expanding networks as it minimizes cost or delay while maximizing quality or bandwidth. The Particle Swarm Optimization algorithm is based on certain social behaviours observed in flocks of birds, schools of fish, etc., from which certain aspects of intelligence emerge. After its development by Kennedy and Eberhart in 1995, this evolutionary paradigm has been seriously studied on and grown in the past decade. The standard PSO model consists of a swarm of particles, moving interactively through the feasible problem space to find new solutions. Each particle has a position represented by a position vector; where *i* is the index of the particle, and a velocity represented by a velocity vector. Each particle remembers its own best position so far in the vector p_{best} and the best position vector among the swarm is stored in a vector g_{best} the search for the optimal position (solution) advances as the particles' velocities and positions are updated. In every iteration, the fitness of each particle's position is calculated using a pre-defined fitness function and the velocity of each particle is updated using the *gbest* and *pbest* which were previously defined. A particle's velocity and position are updated as follows:

$$v_{id} = wv_{id} + c_1 r_1 (p_{Best} - x_{id}) + c_2 r_2 (g_{Best} - x_{id});$$
$$i = 1,2,..., N, and\ d = 1,2,..., D$$

$$x_{id} = x_{id} + v_{id}$$

Particle Swarm Optimization optimizes an objective function by undertaking a population – based search. The population consists of potential solutions, named particles, which are metaphor of birds in flocks. These particles are randomly initialized and freely fly across the multi dimensional search space. During flight, each particle updates its own velocity and position based on the best experience of its own and the entire population. The various steps involved in Particle Swarm Optimization Algorithm are as follows:
Step 1: The velocity and position of all particles are randomly set to within pre-defined ranges.
Step 2: Velocity updating – At each iteration, the velocities of all particles are updated according to,

$$v_i = v_i + c_1 R_1 (p_{i,best} - p_i) + c_2 R_2 (g_{i,best} - p_i)$$

where p_i and v_i are the position and velocity of particle i, respectively; $p_{i,best}$ and $g_{i,best}$ is the position with the 'best' objective value found so far by particle i and the entire.
population respectively; w is a parameter controlling the dynamics of flying; R_1 and R_2 are random variables in the range [0,1]; c_1 and c_2 are factors controlling the related weighting of corresponding terms. The random variables help the PSO with the ability of stochastic searching.
Step 3: Position updating – The positions of all particles are updated according to,

$$p_i = p_i + v_i$$

After updating, p_i should be checked and limited to the allowed range.
Step 4: Memory updating – Update $p_{i,best}$ and $g_{i,best}$ when condition is met,

$$p_{i,best} = p_i \quad if \quad f(p_i) > f(p_{i,best})$$
$$g_{i,best} = g_i \quad if \quad f(g_i) > f(g_{i,best})$$

where f(x) is the objective function to be optimized.
Step 5: Stopping Condition – The algorithm repeats steps 2 to 4 until certain stopping conditions are met, such as a pre-defined number of iterations. Once stopped, the algorithm reports the values of g_{best} and $f(g_{best})$ as its solution.
PSO utilizes several searching points and the searching points gradually get close to the global optimal point using its pbest and gbest. Initial positions of pbest and gbest are different. However, using thee different direction of pbest and gbest, all agents gradually get close to the global optimum.

V. CONCLUSION

In this present work, we have defined an PSO, DSDV improved safe routing approach to transfer data from congestion free and attack safe path. Generally, the shortest path is the most favorite area for the attackers to perform the intrusion, but the presented approach will not cover any node that is having the higher probability of the attack or the congestion. As the communication will be performed over a congestion free

path, the energy and the delay over the network will be reduced. In this work evaluation of AODV (Ad-hoc on demand distance vector) and DSDV (Destination sequence distance vector) and PSO routing protocols' performance on the basis of different criteria for performance. The presented approach is effective in terms of energy and the time as well as provide a reliable route over the network.

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