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A Secure Scheme Using Priority Based Scheduling and Congestion Control (PBSCC) Protocol to Avoid Sleep Deprivation Attack in MANET

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ABSTRACT

MANET is a collection of mobile nodes which are self-organized and decentralized nodes. Securing MANET is a problem that has become a critical one. Sleep deprivation attack is a type of flooding attack in which a group of nodes or a single node is chosen whose resources are to be exhausted. In all types of communication network, congestion occurs. Congestion in MANET causes packet loss, longer delay and poor throughput. To handle this type of scenario priority based scheduling and congestion control techniques are to be used. Congested packet will be distributed equally to the child node to totally avoid loss of packets and transition delays. Furthermore, this technique allocates the priority of many applications simultaneously running on the sensor nodes, which route is own data as well as the data generated from other sensor nodes. The algorithm hence dynamically adapts to the prevailing energy-scenario by reducing the power consumption to prevent the sleep deprivation attack in MANET of the network and takes routing decisions accordingly, based on packet priority. In this paper, We propose efficient Priority Based Scheduling & Congestion Control Protocol (PBSCCP) to achieve minimizing energy utilization, maximizing throughput and maximizing network lifetime higher throughput and packet delivery ratio.

Keywords : Priority Based Scheduling and Congestion Control(PBSCC),Depth Based Routing(DBR),Cluster Head(CH).

I. INTRODUCTION

Mobile ad-hoc network is an independent system of mobile nodes connected by wireless links forming a short, live, on-the-fly network even when access to the Internet is unavailable. Nodes in MANETs generally operate on low power battery devices. These nodes can function both as hosts and as routers and nodes act as intermediate bridges between the source and the destination giving store-and-forward services to all the nodes in the network. Easy deployment speed of development and decreased dependency on the infrastructure is the main reasons to use ad-hoc network. MANETs suffers like lower capacity, limited security, higher loss rates, more delays and jitter as compared to fixed. When large number of sensor nodes is active simultaneously in transmitting the information, data traffic increases than available capacity of network this lead to congestion in network.

The main sources of congestion include buffer overflow, interference, and channel contention, many to one nature (i.e multiple sources and single sink). Congestion causes packet drops at buffer, increased queuing delay and increases packet retransmission. This consumes additional energy and also wastage of communication resources. Congestion directly impact on energy efficiency, decreases link utilization and lifetime of network lowers the throughput.

There are two types of congestion in wireless sensor network. i) Node level congestion is occurred at particular node when the packet inter arrival rate is greater than the scheduling rate, this result in packet loss, increasing queuing delay and requires retransmission of packets This attack can be implemented by forcing the chosen node to use its vital resources e.g. battery life, by frequently sending false RREQ requests for existent or non-existent destination

nodes. Hence the proposed Priority Based Scheduling and Congestion (PBSCC).

II. METHODS AND MATERIAL

1. Related Works

A list of works that has been done to ensure the security in the ad hoc network is listed below:

Ching-Tsung Hsueh[1]has proposed a cross-layer design of secure scheme integrating the MAC protocol..The detailed analysis of energy distribution shows a reasonable decision rule of coordination between energy conservation and security requirements of WSN.

Shivashankar[2] has proposed an efficient Power Aware Routing (EPAR), EPAR identifies the capacity of a node not just by its residual battery power, but also by the expected energy spent in reliably forwarding data packets over a specific link.

Esubalew Yitayal[3] In this paper he has introduced a new energy efficient algorithm called BBU-AODV, which maximizes the life time of a MANET by avoiding routing of packets through nodes with low residual

K. Gomathi[4] has proposed Trust based Clustering Algorithm(TBCA) is proved its superiority with Existing Enhanced Distributed Weighted Clustering Algorithm(EDWCA) based on some metrics like delay, PDR, packet drop and overhead etc.

Meenu Talwar[5]has analyzed with the main concern to to maintain a counter of the number of requests served by various nodes. On the basis of number of requests in a particular time interval the decision will made whether to serve the node's request or not. The threshold values to control the packet-traffic and maintain various criteria.

Surendra Kumar[6] This paper objective is to summarize different types of attacks over MANET, and concerns with studying sleep deprivation attack. Our objective is to design an artificial immune system to secure from sleep deprivation attack and is based on biological Danger Theory

2. Overview of Proposed Priority Based Scheduling And Congestion Control(PBSCC) Protocol

Many sources send data of different applications where congestion occurs. To handle this type of scenario priority based scheduling and congestion control techniques were discussed. Congestion control is done using the sum of the node weights. Each node adds its weight with the received weight downstream and passes it to upstream. The source obtains sum of all weight information and uses it for adjusting the rate. Clustering algorithm to partition sensor nodes is done based on the sending rate and similarity of data obtained. After cluster formation nodes within the cluster communicate with its Cluster Head alternatively on a schedule to save energy.

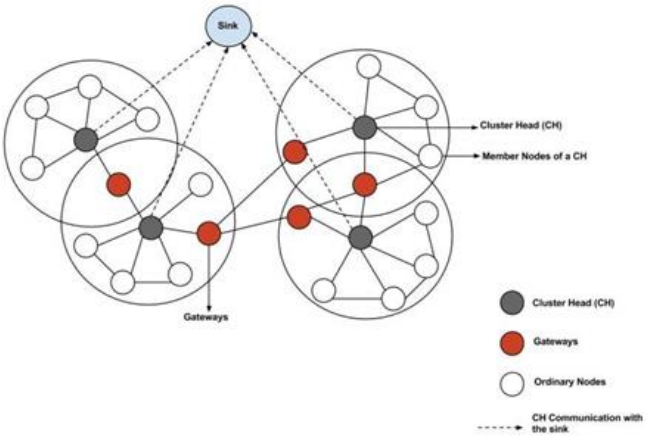

Figure 1. Cluster formation of PBSCC

Sensor nodes are constrained by various resource limitations such as the available memory, battery power, bandwidth, and data rate. These nodes may operate on small batteries for days, months, and even years depending on the application's requirements. This protocol organize the nodes into small clusters, as shown in above figure 1 where each cluster has one cluster head (CH) node that collects data from member nodes and transmits it to a based station (BS). These protocols reduce energy dissipation by eight times compared with conventional routing protocols. Hence, the battery power needs to be utilized efficiently in order to prolong the lifetime of the nodes and thus avoid sleep deprivation attack which send false requests to utilize all the energy of the nodes.

3. Methodologies Adapted

In order to reduce the network traffic that occur in the transmission path , another packet of data might be send from source to destination. The size and type of the packet won't consider so the transmission rate gets low and end to end delay increases in the network. The Priority Based Scheduling and Congestion Control (PBSCC) adapt various methodologies to avoid congestion they are

3. 1. Node Clustering
3. 2. Path or Route Discovery
3.3. Priority Based Scheduling
3. 4. Traffic Control and Packet Transmission

3.1. Node Clustering

The above mentioned module is describing the manet network creation and selection of the node by clustering. The process of node clustering is done within same behavior node and based on the fitness value of every particular node. The MANET nodes are having different behavior by nature and clustering the same behavior node for better and efficient transmission of packet on the network.

3.2. Path or Route Discovery

The path and route is being discovered for transmission of the packet or data by selecting source and destination. The route discovery is completely based on the source and destination mode where it selects the node for efficient transmission through The nodes gather data from their vicinity and broadcast this to a centralized location for further processing and within the node transmission capability.

3.3. Priority Based Scheduling

The priority of the data transmission is being scheduled based on the load over network and the packet size. The priority scheduling process is calculating every packet load. The packet transmission is first looking for the best route and path for transmitting the packet within transporting network layer. Then it sorts all the bearers priority based upon the value of their packet and route.
The proposed priority-based EDF scheduling is defined
Packet Queue (Pq) = Priority (P) + Deadline (D)
Deadline (D) = Packet Arrival (Pt) + Max Latency (Mx).

3.4. Traffic Control and Packet Transmission

The above mentioned module is describing the traffic controlling system and packet transmission in network. The several network layers is being identified such as Network, MAC and the source traffic, transmission traffic and destination traffic is being calculated to prevent the traffic on network for a smooth transmission of packet. The transmission process is also finding the route and path for transmitting a packet from source to destination.

III. RESULTS AND DISCUSSION

4. Proposed Architecture

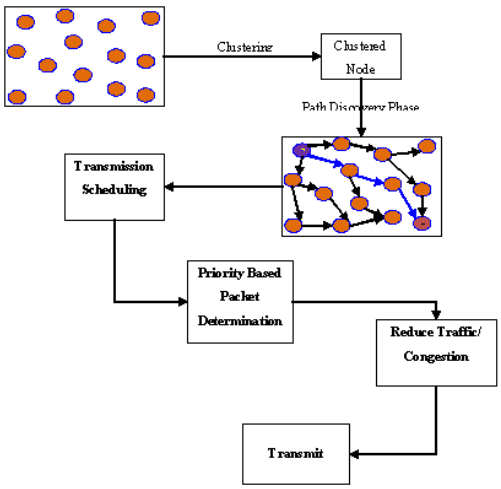

Figure 2. Overall Architecture

5. Algorithm Used

send(pp_schedule[count_packet]) - send the scheduled packets to the MAC layer.
pp_schedule[packet_count]= pp - create a schedule of packets.
packet_priority=(rand() %100) - assign the random priority
to packets
packet_priority = (rand() % 100);
check priority from header :
if(packet_priority > 50 && packet_count < schedule_packets)
{
Its high priority packets

```
packet_priority;
send_pkt;
}
else if(packet_priority<5)
{
pp_schedule[packet_count]= pp;
Its low priority packets
packet_priority;
This packet would be scheduled after
high priority packets have been scheduled
if(packet_count= = scheduled packets)
{
sending low priority packets
count_packet;
send_pkt;
send(pp_schedule[count_packet]);
low priority packets
count_packet+1;
}
store this packets in an array and schedule it once all the
high
priority packets
return;
}
```

6. Results

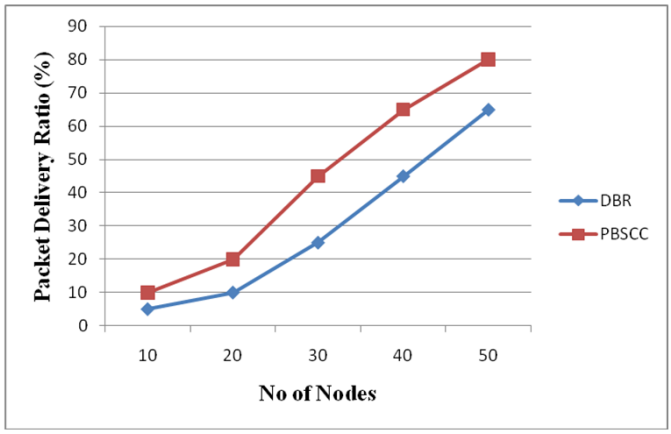

Figure 3. Comparison of Packet Delivery Ratio

Thus the proposed PBSCC protocol reduces the congestion that occurs in network by clustering followed by priority based scheduling in which the prority is given by fitness value and the shortest path is chosen which thus gradually avoid the traffic which thereby increases the throughput delivery ratio in the network. The following graph Figure 3 shows the increase of throughput delivery ratio with comparison to the existing Depth-Based Routing(DBR) which prevents the nodes from sleep deprivation and securely transmit the packet from source to destination.

IV. CONCLUSION & FUTURE WORK

Our proposed system will help to maintaining database of all the nodes in the network for required information to each node about every other node. Priority Based Scheduling and Congestion Control Protocol (PBSCCP) will improve network efficiency, throughput as well as packet delivery ratio and minimize delay. In future, we would focus on group communication data transmission and node security and lifetime maximization. So at same time we can transmit the packet to another group in efficient and secure way within minimum power consumption.

V. REFERENCES

[1] Ching-Tsung Hsueh et.al, "A Secure Scheme against Power Exhausting Attacks in Hierarchical Wireless Sensor Networks" Citation information: DOI10.1109/JSEN.2015.2395442, IEEE Sensors Journal,2015.

[2] Shivashankar et.al, "Designing Energy Routing Protocol With Power Consumption Optimization in MANET", 2168-6750 2013 IEEE. Translations and content mining are permitted for academic research only. VOLUME 2, NO. 2, JUNE 2014.

[3] Esubalew Yitayal et.al, "A Balanced Battery Usage Routing Protocol to Maximize Network Lifetime of MANET Based on AODV", S. Balandin et al. (Eds.): NEW2AN/ruSMART 2014, LNCS 8638, pp. 266–279, 2014. © Springer International Publishing Switzerland 2014.

[4] Gomathi, et.al," A Secure Clustering in MANET through Direct Trust Evaluation Technique", 978-1-4673-6618-2/15/$31.00 ©2015 IEEE.

[5] Navneet Sandhu et.al," An introduction of sleep depriviation attack in AODV", International journal of Science Technology & Management (IJSTM) ISSN: 2229-6646,2015

[6] Surendra Kumar et.al,"Prevention in Sleep DepriviatonAttack in Manet", Volume IV, Issue II, February 2015 IJLTEMAS ISSN 2278 – 2540,2015.