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Transmission Based Clustering to Detect Self-seeking Nodes in MANET

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Abstract: Data transmission based clustering method is proposed in order to find the self-seeking node in Mobile Ad-hoc Networks (MANETs) and the section of Cluster Head (CH) based on Node Transmission Ratio (NTR) and the energy levels. The selection of CH is done based on the NCR and the energy levels. In order to contribute network inside the infrastructure range the CH is used. The behaviour of the entire communication node is viewed by the destination node. The clustering based on communication gives better results over packet delivery rate, packet delay rate, packet loss rate and also improved energy efficiency when data transmission occurs.

Key words: MANET, self-seeking, node transmission range, cluster head, network, destination

INTRODUCTION

A wireless connectivity scheme called MANET is used to construct the nodes in network. It acts as an own configuring system, so that, the need for the stable structure is less. The MANET nodes can also acts as a router. Due to the mobility in nature the network topologies and the nodes are changed often. With the help of the nodes present in the ad-hoc, a self MANET system can be made as shown in Fig. 1.

All the nodes should perform routing to keep the connectivity within the nodes in the network traffic. The network constituents present in the set of connections may be there in the cellular phones, personal computer and so on.

Literature review: Watchdog and path rather in mobile ad hoc is a mechanism based on detection and it excludes principle to deal with the self-seeking nodes. It makes use of dynamic source routing as base protocol (Maltz, 1996) with the two components namely watchdog and path rather. The watchdog is used only to identify the self-seeking nodes according to the requests.

SORI protocol is of two records as discussed by He *et al.* (2004), namely the overall assessment record and the local evaluation record given by the nodes about their neighbours. All nodes in the network will keep the tables of local assessment of their neighbour nodes. Based on the tables the trust of a node is calculated. In MANET a Mobile Agent supportive Recognition of Self-seeking Node (MARSN) exploits a position of Mobile Agents (MA) that can shift as of one node to another node surrounded by a network Distance Effect Routing

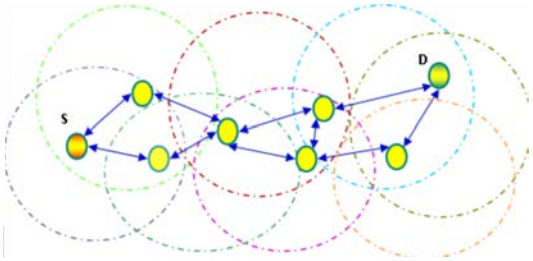

Fig. 1: MANET structural design

Algorithm for Mobility (SE_DREAM) in MANETs (Shanthi and Anita, 2016). This system will minimize both the computation complexity and computation overhead.

A scheme for detection of selfish nodes mechanism was designed in performance analysis of black hole attacks in geographical routing MANET (Shanthi and Anita, 2014). In this scheme, each node is accepted to contribute on the continual basis contained by a time frame. The unsuccessful nodes will go on a testing for their suspicious behaviour (Fanian and Rafsanjani, 2013). In view of monitoring node, a request from its neighbouring node sent to forward the information to check the time difference between the preceding request and the prominence of the requestor.

The combination of RSA and Enhanced Distributed Weighted Clustering Routing Protocol (EDWCRP) by (Orallo *et al.*, 2012) is done to secure multicast key distribution. The cluster head maintained the group key which updates about the changes in the membership. To avoid the CH from becoming the bottleneck, a secondary

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Cluster Head (SCH) is also used by Gomathi and Parvathavarthini (2015). Using the MD-5 hash authentication mechanism the mobile nodes get valid.

MATERIALS AND METHODS

Proposed data transmission-based clustering scheme: A scheme named Data Transmission based Clustering (DTSC) to observe self-seeking nodes in MANET environment is presented. Based on the router messages the behaviour of the node is monitored and the NTR is calculated. The estimation of NTR obtained to be more prominent than 30% and acts as a typical hub that can transmit and receive the data. But if the estimation of NTR obtained is lesser than 30% then the node said to be as a self-seeking node. In every cluster group the CH is selected based on highest transmission ratio and the high energy nodes.

The clusters that are obtained are is shaped based in node location. The nodes are grouped to each other based on the transmission range to communicate with each node and the selection of CH is done based on the NTR calculation and energy level. By comparing the nodes, the nodes with higher energy level and the higher NTR value (approx. 90%) are preferred for data communication from source to sink.

Node transmission ratio estimation: The NTR is calculated by using the R_{RQ} and the R_{RP} messages that are sent within the network. The NTR is estimated for the node with the difference between the number of R_{RQ} message received to a demanding node and the number of dropped R_{RP} (R_N) statement to the number of R_{RQ} received. The NTR estimation is done using Eq. 1 and 2:

$$NTR = \left(\frac{R_{RQ}-R_N}{R_{RQ}}\right)*100 \quad (1)$$

Where:
R_{RQ} = Receipt route Request
R_N = Not send route Reply

$$R_R = R_{RQ}-R_{RP} \quad (2)$$

Where, R_{RP} = Route Reply

RESULTS AND DISCUSSION

The performance of the anticipated system is scrutinized by using the tool Network Simulator NS-2. It is probable to inconspicuously examine the events in the network scenario. The simulation parameters and the performance analysis are listed in Table 1.

Table 1: Model parameters

Parameters	Values
Time of simulation	52 sec
No. of nodes	3875
Simulation area	1200×600
MAC type	802.11
Network interface type	Wireless phy
Antenna type	Omni antenna
Transmission range	220 m
Routing protocol	DSR

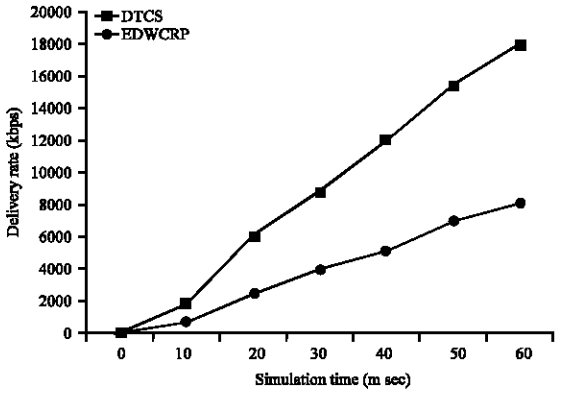

Fig. 2: Delivery rate of packets

Packet delivery rate: The Packet Delivery Rate (PDR) is said to be as the packets rate that are delivered to the destinations to the total number of data packets sent by the source. The PDR estimation can be done using Eq. 3:

$$PDR = \frac{\text{Packets received rate}}{\text{Packets sent rate}} \quad (3)$$

Figure 2 shows the packet delivery rate for the proposed and existing scheme. It shows that the DTSC has higher PDR while compared to the existing scheme.

Packet loss rate: Packet loss rate is said to be as the difference between the packets sent and the packets received in the network per unit time as in Eq. 4:

$$PLR = \frac{\text{Total packets\_Dropped}}{\text{Total packets\_sent}} \quad (4)$$

Figure 3 shows the packet loss rate for the proposed and existing scheme. It is monitored that the DTSC has lesser PLR while compared to the base scheme. This result verifies the PDR maximizes DTSC over the existing EDWCRP method.

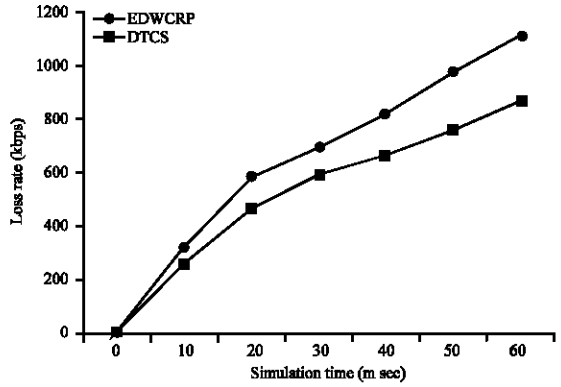

Fig. 3: Loss rate of packets

CONCLUSION

Data transmission based clustering method is proposed to find self-seeking nodes (DTCS) in MANET introduces the design of node communication based upon the RREQ and RREP messages playback within the communication network. By contrasting and reproduction of EDWCRP system, the DTCS has proved the better performance regarding packet loss rate, packet delivery rate and good energy efficiency during data transmission. The system can be used in the areas of emergency criteria, natural calamity supervision and military operations to make sure the consistent data relief progressing.

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