An Energy Efficient Clustering Algorithm in Mobile Adhoc Network Using Ticket Id Based Clustering Manager

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Summary
Many emerging mobile ad-hoc network application communications are group-oriented. Multicast supports group-oriented applications efficiently, particularly in a mobile environment that has a limited bandwidth and limited power. Energy effectiveness along with safety are 2 key problem in MANET design. Within this paper, MANET is presented with a stable, energy-efficient clustering technique. In this proposed work advanced clustering in the networks with ticket ID cluster manager (TID-CMGR) has formed in MANET. The proposed routing scheme makes secure networking the shortest route possible. In this article, we propose a Cluster manager approach based on TICKET-ID to address energy consumption issues and reduce CH workload. TID-CMGR includes two mechanism including ticket ID controller, ticketing pool, route planning and other components. The CA (cluster agent) shall control and supervise the functions of nodes and inform to TID-CMGR. The CH conducts and transfers packets to the network nodes. As the CH energy level is depleted, CA elects the corresponding node with elevated energy values, and all new and old operations are simultaneously stored by CA at this time. A simulation trial for 20 to 100 nodes was performed to show the proposed scheme performance. The suggested approach is used to do experimental work using the NS- simulator. TIDCMGR is compared with T-ID BRM and PSO to calculate the utility of the work proposed. The assessment shows that the proposed TICKET-ID scheme achieves 90 percent more than other current systems.

Key words:
MANET, AODV.cluster ,cluster head, TID-CMGR; CA

1. Introduction

MANET is one of the most evolving technology which facilitates users to communicate regardless of both physical infrastructure and location. MANETs are self-configuring networks that lack infrastructure and a central controller [1]. This network is both effective and well-designed [2]. Mobile devices reflect network self-organizing capabilities without depends on any underlying foundation. These networks are easy to communicate, adaptable, and hence they're improving. Mobile ad hoc network (MANET) is a type of mobile network that encloses and communicates with remote mobile nodes. MANETs are designed in an effective way in order to travel at any speed and in any direction. The paths of MANET nodes are compared to those of a destination node. MANET is a group of mobile self-organizing nodes which transmit across a shared wireless multi-hop channel without any basic foundation. Multihop communication is well-known in the MANET for determining the overall network limit and execution (Xiang and Yang 2018; Liu et al. 2017). A cluster improves MANET's presentation to some extent. If the approach is adequate, it speeds up data flow while lowering the delay rate [3].

Each node in a MANET system consumes more energy. When a node's energy is depleted, it flattens out. If the depleting node is a cluster head, it will fail together with the remainder of the nodes in the cluster. the cluster control structure is commonly used to examine the scalability issue in vast exclusive MANETs]. MANET is composed of legally identical nodes with wireless transceiver devices which does not reliant on any pre-existing infrastructure. A strong routing system is also essential since mobile nodes have low energy, computation, and packet transmission capabilities. Furthermore, battery power is required by these mobile nodes. Data package routing is the most significant and challenging problem [4]. Since any node can enter or exit the network at any time, and topology changes frequently, identifying a packet routing forwarding node can be difficult. Because MANET routing demands the setting of additional instruments, energy efficiency in MANET execution is substantially more difficult to achieve. Similarly, the proposed approach K-medoid clustering in the network (KMC) collects path information such as node dependability, block along the path, residual energy of the node along the path, and time duration Once the packet is acknowledged, the destination calculates a pheromone tally for the course based on the data stored in KMC [5]

MANET is a wireless mobile node system that autonomously organizes itself in arbitrary and temporary network topology. MANET belong to the family of wireless multi-hop networks with complex

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interconnections between a group of mobile nodes, cooperating to establish n/w connectivity. Fixed network infrastructure or administrative support are not there in adhoc network, whereas a conventional wireless network requires some form of the fixed network infrastructure and federal administration for its operation. Ad hoc networks with dynamism create a wireless network among themselves any time, wherever and display as self-creating, self-organizing and self-administrating behaviors [6]. The physical characteristics, organizational format and dynamic topology are the distinguishable parameters of MANETs. In any situation where temporary network connectivity is necessary, such network types are useful. Owing to the limited wireless network interface transmission range, manifold network hops may be required to transmit the data between the source and the destination nodes across the network. A MANET network poses a significant technical challenge because of the many constraints imposed by the underlying network [7-9].

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The upcoming section of the paper is organized section 1 introduction, section 2 related work. Section 3 briefly describes our proposed methodology and algorithm explains detailed manner. Section 4 the performance evaluation compares the previous algorithms in graph format. Section 5 conclusion.

2. Related work

Malek Alrashidi et.al [10] suggested a WSN clustering algorithm which based on residual energy value, degree of interaction, distance between CH and other corresponding nodes in the network, and antenna alignment. Current clustering approaches for set WSNs, such as adaptive clustering hierarchy based on low energy, low energy adaptive clustering hierarchy -C, and also LEACH-B, are compared to this process. Different packet transmission over long distances by CH is reduced by this proposed solution, which also limits their energy consumption and eliminates that shadow field problem. By preventing overt data sharing, this approach thus reduces hotspot issues and increases safe transmission in MANET.

Nagendranath and Ramesh Babu [11] in MANET Construction, Energy conservation and security are two critical topics. The authors introduced a techniques energy efficient stable as well as secure clustering (EESSC). The presented EESSC technique employs a fuzzy logic mechanism to properly pick cluster heads (CHs) based on five variables: remaining energy level, node degree, distance, confidence level, and node mobility. Furthermore, a standby CH (SBCH) is added to be useful in the event that the CH fails, passes out of the cluster, or is comprised. In such an event, SBCH is invoked to function as CH, and another SBCH is selected. This mechanism contributes to network availability with no interruptions, as well as an increased degree of protection. The EESSC simulation takes place under various conditions, and the results validate the superiority of the given model over the compared models.

Naghma Khatoon and Amritanjali [12] addressed the issue of Mobility Tolerance and Energy Consumption in MANETs, where nodes move in unpredictable directions and have low battery capacity, resulting in frequent topology changes. These limitations are being studied in depth in order to extend the life of those networks. The authors focus on flexibility and energy consumption when developing a clustering algorithm based on the stochastic multi-agent parallel PSO search technique. The work is tested using the NS-2 network simulator. These authors developed a PSO-based mobile ad hoc network with a mobility-conscious force and well-organized clustering. The main goal of this article appears to be to consider the path of node mobility when choosing a CH, as well as its capacity, which appear to be the two major concerns of such a MANET. They also create a new cluster structure fitness function based on the intensity of the CHs and the non-cluster leaders' mean distance from their respective CHs. This FF indicates that nodes are associated with the CH with the greatest power and least divergence from equilibrium, as well as nodes with the shortest average distance to their respective CHs.

Amutha et.al [13] address energy issues and leverage CH workload, we suggest a cluster manager based cluster head selection approach. CMBCH is made up of two parts: the CM and the CH. Charge of coordinating and tracking the operations of the nodes by the Cluster Manager. The CH is in charge of leading and transferring packets between network nodes. When the current CH energy level is depleted, CM selects a another node with a high level energy, and all previous and upcoming CH operations are concurrently stored by CM. To demonstrate the efficacy of the projected scheme, a mock-up trial was carried out for 20 to 100 nodes using the Ad-hoc On-demand Distance Vector routing protocol. Marjan Najafi et al. [14] propose a hierarchical routing strategy based on clusters. The system they are proposing is three steps. In MANET, cluster-based approach is efficient for routing. Thus CH improves routing efficiency based on head and control utilization, cluster reformation is anticipated due to the relocation of CH and the dynamic change of cluster members, which increases the overhead of cluster reformation. The authors are defined as a grouping algorithm using hierarchical MANET routing, and thus clusters first type with low overlap by a FLOC clustering process.

Alamgir Naushad et.al [15]One of the major constrain for successful communiqué in mobile ad hoc n/w is maintaining connection reliability across randomly deployed network nodes (MANETs). At hand have to be a coherent mock-up to decide appropriate tactic that deal with the concern of connection constancy in MANETs. The authors in attendance presented a novel dynamic link connectivity (DLC) policy that uses Hello messaging to maintain association solidity by providing well-organized link connectivity among neighboring nodes. They also perform a stochastic analysis of the expected line of attack, which predicts the potential connection grade between neighboring nodes using a Markov mechanism's stepladder. They monitored that the obtained signal frequency, the signal-to-noise ratio, the switching rates between interaction and disconnection states, and the rates of connections and disconnections in the steady-state condition all affect the communication reliability. Cluster stability in MANET is a significant problem. The ad hoc mobile network's overall stability will suffer as a result of low network stability, which will result in cluster failure, increased energy demand for reclustering, and a decline in overall network stability. Abbas Karimi [16] implemented weight-based clustering algorithms within sort to improve cluster reliability. These algorithms, on the other hand, only use a portion of the nodes' capabilities. As a result, they reduce the weight precision in deciding node competency and result in incorrect cluster head placement. This paper introduces a new weight-dependent algorithm that determines a weight of the node based on its own characteristics as well as the direct influence of neighbouring nodes' characteristics. It determines the influence and power of effective relations among nodes on final weight of the node. The best candidates for cluster heads are given the most weight, and the precision of node selection improves by this technique.

Charu Gandhi and Anubhuti Roda Mohindra [17] To maximise the network's energy spending and lifetime, various clustering schemes are used. However, as the number of data-forwarding clusters grows, so does the energy demand. This paper describes an energy efficient clustering strategy for collaborative data routing in a MANET. The CH is selected based on the capacity of the nodes to process the connection metrics. Reduce the reclustering method, maintain contact flow, and reduce the overhead depending on location facilities. This method employs the grouping technique to minimise information changes by reducing them to a cluster.Young j O t.al [18] propose a sophisticated energy-saving optimal route scheduling algorithm The suggested algorithm determines the routing direction by taking into description the virtual angle, which is the spaceamong the source node and the BS. Proposed algorithm makes use of the Ist-order ratio model's energy utilization equation. The suggested algorithm selects the intermediate node based on its relative angle between the nodes and the coverage.

Venkatasubramanian, et al. [19] suggested a TID approach that operates based on node attributes and routing maintenance. This method is controlled by the TID-Routing Manager. On the basis of node variables such as speed, energy, location of nodes,and so on, the TID routing manager maintains the ticket pool and assigns a unique ticket ID. The suggested routing method ensures that communication is reliable in the quickest time possible. The proposed method is used to do experimental work using the NS2- simulator. The proposed work efficiency compared with T-ID BRM with TABRP, OGFSO and PDMR. According to the findings, the proposed Ticket ID system performs 94% better than other existing approaches. This experiment is an earlier phase of the work being suggested and its limitations are reinforced in this article.

3. PROPOSED METHODOLOGY

Many MANETnetwork implementations require data to flow from several sources to a single sink. MANET nodes, in one of the other hand, they have restricted capacity, computing and storage memory resources, which require efficient use of resources. As all MANET are using the same variables, the sensed data could be redundant. The steering methods are designed in accordance with the application specifications, taking into account the characteristics and limitations of nodes. The most widely used routing restrictions: (i) adaptive redundancy (ii) short latency (iii) vigor efficiencies (iv) QoS performance constraints, etc.

Because of their simplicity, most current routing protocols for WSNs use one-hop neighborhood information. Despite increasing configuration complexity, using two-hop neighborhood information in routing decisions results in routing with less hops in the network and aids in invalid evasion in WSN. In categorize to ensure a longer network life and to provide transmission in time, the data traffic must be routed across the network with permitted reliability or energy efficiency. Two adaptive routing protocols are proposed to address the above implementation demands and challenges such as reliability, latency, energy efficiency and timely distribution service.

3.1 THE CLUSTER-AODV CLUSTERING AND ROUTING SCHEMES

In MANETs routing protocol AODV generally transmit small number of packets throughout the network. When the number of nodes increases, the network congestion may occur. which increases the network overhead? This overhead problem is rectified by using clustering technique. The Clustering technique efficiently helps the path identification and maintenance. Cluster AODV technique aids to achieve efficient transmission of packets by reducing routing overhead.

In cluster AODV technique, cluster head(CH) plays a vital role throughout the network. CH maintains and updates the status of every node by using M-hop CH table. CH table has fields such as cluster ID, size, status and expiration time shows in fig 3. The value in the fields dynamically updated when a packet has to be sent via cluster by CH. Consider M=2, where two hop clusters only used. If CH1 send a message to CH2, The CH2 must reply within the expiration time. The CH's expiration time is the present time plus the Alive Update interval.CH status will be marked as alive or not alive based on acknowledgement and also within the expiration time. If there is no acknowledgement from CH2 the status will be updated as "not alive".

Cluster size	CH-ID	CH status	CH expiration time

Figure 1 Cluster head architecture on AODV protocol

The major demerits in cluster AODV technique is that if once CH fails, the gathered information will lose in the cluster. The CH re-selection may possible once if any transmission failure occurs. This re-selection process based on on-demand purposes for transmission of packets. Thus CH fails entire cluster will fail and it has to wait until another CH re-elected. In our proposed system, we introduced TID-CMGR and CA (Cluster agent) to overcome this problem of CH failure. TID-CMGR controls the entire cluster by electing CA to monitor every CH in the network based on the high energy level and low distance. CA updates every information about the status of CH to TID-CMGR. If any CH will fail, CA elects another CH to maintain the information. For every instances, CA sends information to TID-CMGR from CH and updates dynamically. Thus compared to cluster AODV technique, we can easily trace out transmission failure by using TID-CMGR and CA.

The network model, TID-CMGR manager, ticketing pool, and route planning are important components of the proposed architecture. Initially, the proposed scheme set up a network of nodes. The proposed model's core is the TID-CMGR. In this case, the ticket routing manager is in charge of overall network efficiency. If the network has been established, all nodes must be registered. The TID-CMGR manager assigns the ticket ID from the ticket pool to each node. This one-of-a-kind ticket-ID tracks each node's actions and saves them for future use. The next step in this process is to classify the network's active nodes and inactive or resting nodes. The Ticket ID – RMGR allocate agent node for monitor and generate the cooperative node list and it forms the cluster formation. Then the cluster head selection is done by TID-CMGR, and finally calculatethe communication

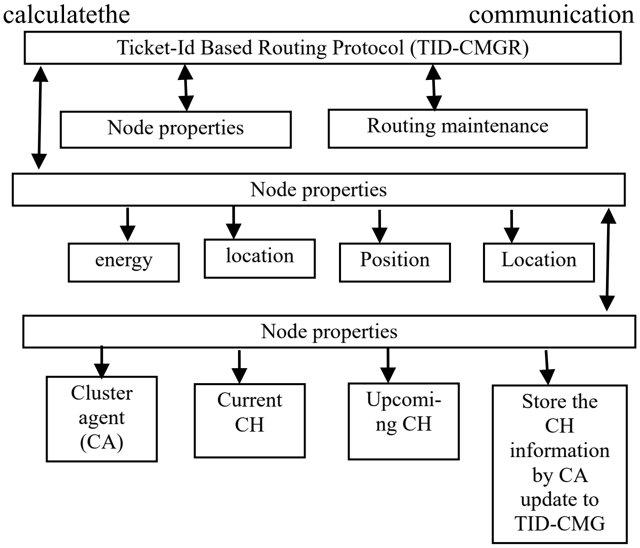

Figure-2 TID-CMGR routing structure

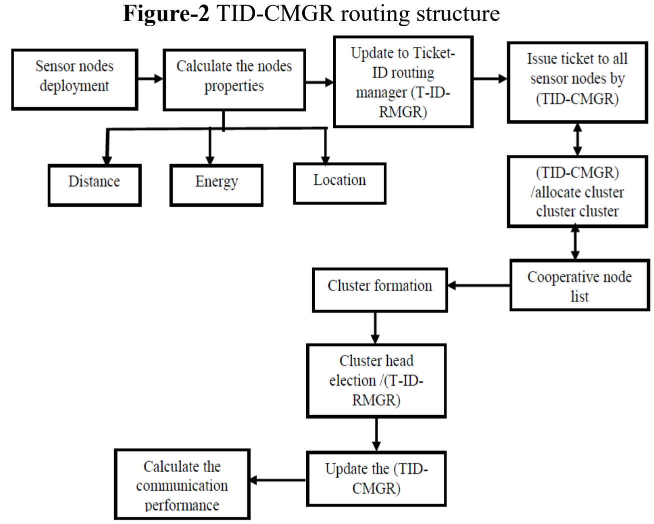

Figure-3 architecture of proposed system

In fig 4 – MN (mobile node) is deployed in a random fashion in the network area (1700*1700) propagation ground (S0-S7) first cluster (S8-S15) in second cluster (S16-S23) in third cluster (S24-S31). There are 31 mobile nodes in all. The T-ID-CMGR plays the primary role in our proposed scheme, controlling, monitoring, and managing the whole network. The agent node is assigned to the T-ID-CMGR for tracking purposes. The (CA1, CA2, CA3, CA4) cluster agent node gathers the node's properties (energy, position, and distance) and communicates them to the TID-CMGR. According to the information provided by the agent nodes, the TID-CMGR determines which node acts as CH, which node acts as SN, and which node acts as upcoming CH. Initially, the SN was deployed in a random way and sent "hello" messages to nearby nodes. Whichever node receives the messages and sends an acknowledgment to the sink node is considered a participating node in the cluster member node creation. Why node does not give the acknowledgement? The node is considered idle (sleeping). Finally, the agent node gathers the data and informs the TID-MGR. Gather the information of the active nodes and distribute the Ticket to all mobile nodes to form the cluster. TID-CMGR will miss idle nodes

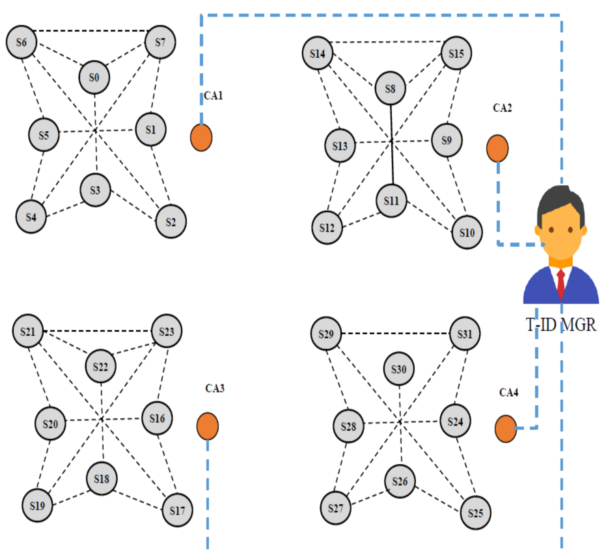

Figure 4 cluster formation using TID-CMGR

ALGORITHM FOR TID- CLUSTER MANAGER BASED CLUSTER FORMATION (TID-CMGR)

Input: T-ID (ticket id)

Output: mobile node properties

Step-1

1. *eployed the mobile nodes* $s_{ix}[i],[j]$ *// mobile node deployed with (i,j) coordination*

Step-2

2. *alculate the node properties* $s_{ix}(d), s_{ix}(l), s_{ix}(e)$

i. *//* $s_{ix}[i][j]$, $(x_{i,x} - x_{j,y})$ *x,i coordinates and ,y,j coordinates* $(y_{i,y} - y_{j,x})$*calculate with x and y coordinate distance;*

ii. $s_{ix}[i]\,[j](e)\; energy = \frac{I_{ex}-I_{er}}{R_t}$ *// node energy defines* $I_{ex} \rightarrow intial\ energy; I_{er} \rightarrow Residual\ Energy\ of\ a\ node\ R_t \rightarrow Response\ \ time;$

iii. *Total energy consumed (TEC)* $=\sum_{i=0}^{n} N_{i,j}\ 1\ [s_{ix}[i][j](e);$

$s_{ix}[i]\,[j](l)\ location =$

iv. $f(x,y,z); f(x_0,y_0,z_0), f(x_1,y_1,z_1), f(x_2,y_2,z_2) \ldots . f(x_n,y_n,z_n)$ *//* $f(x,y)$ *coordinates of x,y position ns2*

v. $s_{ix}[i][j](l)$*deployed in network area (1800*1800) propagation as per NS2 simulation;*

vi. $s_{ix}[i][j](e), s_{ix}[i][j](l), s_{ix}[i][j](d) \rightarrow T_{id-mgr}$ *// update the mobile node properties, distance, energy, location to the (T-ID-RMGR);*

Step-3

$s_{ix}[i],[j] \rightarrow$

3. $send\ \ "hello"\ messages\ to\ all\ \ neighboring\ mobile nodes$ *;*

a) *Case (i)*

b) *If received the message to neighboring node send acknowledge* $s_{ix}[i],[j] \rightarrow active\,;\ s_{ix}[i],[j] \leftarrow ack\,;$

c) *Case (ii)*

d) *If not received the message node state is idle* $s_{ix}[i],[j] \rightarrow idle\ s_{ix}[i],[j] \leftarrow no\ ack$ *// node state is sleeping mode*

End

Step-4

4. *Issue the ticket-ID to all active mobile nodes and allocate the agent node to each cluster*
5. $T_{id-mgr} \rightarrow s_{ix}[i],[j]$*; issue the ticket-id to all mobile nodes;*
6. $T_1 \rightarrow s_{ix_1}[i],[j];\ T_2 \rightarrow s_{ix_2}[i],[j];\ T_3 \rightarrow s_{ix_3}[i],[j] \ldots\ T_n \rightarrow s_{ix_n}[i],[j]$*; // all ticket-id issued to all mobile nodes;*
7. *T-ID success rate (TSR)*

1. $T_{id-mgr} = \sum_{i=0}^{n} \frac{Issue\ T-ID}{total\ number\ of\ nodes} (T_{mgr})$*// update* T_{id-mgr}
2. $T_{id-mgr} = \sum_{i=0}^{n} \frac{Received\ t-ID}{total\ number\ of\ nodes} (T_{mgr})$ *// update* T_{id-mgr}

8. *Generate the cooperative node list update the* T_{id-mgr}

Step-5
allocates the agent (monitor) node intermediate to T-ID-MGR; // calculate the nodes energy which node have
9. $T_{id-mgr} \rightarrow CA_n(cluster\ agent\ node);$ *// monitor the cluster and CH performance update to* T_{id-mgr}*;*
End;

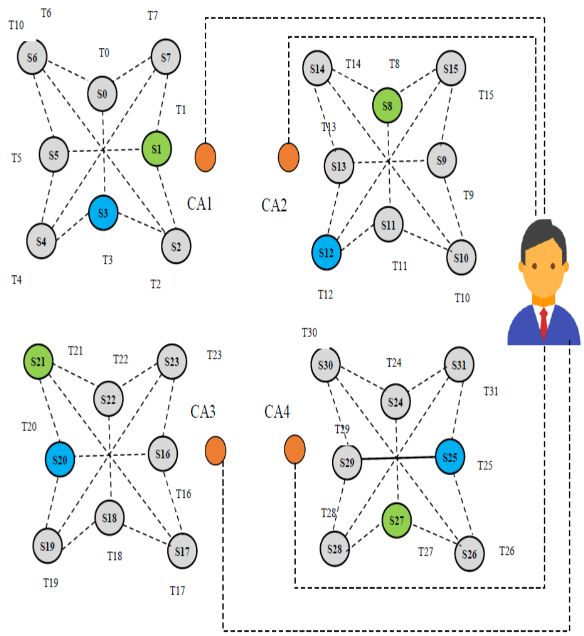

Figure 5 cluster head election process using cluster agent node

ALGORITHM FOR CH SELECTION PROCESS USING CLUSTER AGENT NODE WITH (TID-CMGR)

Input: $CA_n(\ cluster\ agent\ node);\ T_{id-mgr}$
Output: CH (cluster head);
Begin
{
T_{id-mgr} *Update the active node list and idle node list;*
Allocate the $CA_n(cluster\ agent\ node)$ *by* T_{id-mgr}*; // allocate the agent node for monitor and terminate*
$s_{ix}[i],[j] \rightarrow sensor\ node\ list\ updated\ by\ T_{id-mgr}();$
}
Choose CH election process;
{
Case (i)
Calculate the distance $s_{ix}[i][j](d)$ *==low; // eligible to participate the CH election;*
Calculate the $s_{ix}[i][j](s)\frac{I_{ex}-I_{er}}{R_t}$*= good;*
$CA_n = (s_{ix}[i][j] < (s_{ix}[i][j](d)|\ \ |(s_{ix}[i][j] > (s_{ix}[i][j](e)$
$CA_n s_{ix}[i][j](d)$ *== low and* $s_{ix}[i][j](s)\frac{I_{ex}-I_{er}}{R_t}$*= good;*
Eligible to participate the CH
$CA_n \rightarrow T_{id-mgr}$ *// update the CH to ticket id manager*

}
Case (ii)
{
$CA_{n=}s_{ix}[i][j](d)$ *== medium; // eligible to participate the CH election;*
$CA_n = s_{ix}[i][j](s)\frac{I_{ex}-I_{er}}{R_t}$*= average;*
$CA_n =$
$(s_{ix}[i][j]medium\ (s_{ix}[i][j](d)|\ \ |(s_{ix}[i][j]\ medium(s_{ix}[i][j](e))$
;
$CA_n = s_{ix}[i][j](d)$ *== average and* $s_{ix}[i][j](s)\frac{I_{ex}-I_{er}}{R_t}$*= medium;*
Eligible to participate the next level of CH;
$A_n \rightarrow T_{id-mgr}$ *// update the CH to ticket id manager next level CH;*
}
Case (iii)
$CA_{n=}s_{ix}[i][j](d)$ *== high; // ;*
$CA_{n=}s_{ix}[i][j](s)\frac{I_{ex}-I_{er}}{R_t}$*= low;*
$CA_{n=}(s_{ix}[i][j] > (s_{ix}[i][j](d)(s_{ix}[i][j] < (s_{ix}[i][j](e));$
$CA_{n=}s_{ix}[i][j](d)$ *== high and* $s_{ix}[i][j](s)\frac{I_{ex}-I_{er}}{R_t}$*= low;*
$CA_n \rightarrow T_{id-mgr}$ *// update the CH to ticket id manager act as mobile node;*
Node act as mobile node;
}
End

The TID-CMGR issue the Ticket to all mobile nodes. The TID-CMGR known the current updated status. Prior to the CH election process. Normally, retrieve the most recent information from the agent node (CA1, CA2, CA3, CA4) based on the TID-MGR data. how many nodes are ready to participate the network? How many nodes are active and idle state? all this status updated to the TID-MGR. The TID-MGR decides which node act CH in algorithm 2. Represents all updated list will have initialized .CH election process starts.

In fig-5 first region CA1(S0-S7) and the second region CA2 (S8-S15) and third region CA3. (S16-S23), fourth region CA4 (S24-S31). In the first field, which node has the most energy and low distance the node performance is good the agent elect CH (S1), the upcoming CH will be chosen by the cluster agent CA1(S3) is the next upcoming CH. The packet transmitting process begins, and after a particular period of time, the existing CH energy will automatically have depleted, because of the reason of long time packet transmitting. At that point, the agent gathers all (S1) packet information and stores the TID-MGR. Then, have the incoming CH (S3) function as the new CH. The same procedure will be followed for all cluster agent regions. The key contribution of our proposed mechanism

TID-MGR is to reduce contact latency and increase device reliability and communication consistency.

4. Experimental results

4.1 Simulation Environment and Parameters

The proposed T-ID BRM is executed in the network Simulator-2. In the simulation environment, the network is built with 120 nodes between 1800 × 1800 m2. This network is a dynamic one created using a Random way mobility model in which the nodes are free to move anywhere. Here IEEE standard of 802.11 Mac protocol is taken as the link-layer protocol. The network traffic is generated using a multicast constant bit ratio. In this experiment, both 802.11b and IEEE 802.11e WLAN heterogeneous traffic is considered. The node mobility range is between 10-35/ms. The TCP or UDP network topology is used for establishing the data connection. The packet size is 2000 bytes, with the data rate at 24 Mbps. The other simulation parameters are described in the below table.

Simulation Parameter	Value
Simulator	Network Simulator-2
Simulation time	200 seconds
Number of nodes	100
Simulation area	1800 × 1800 m^2
Mac Protocol	IEEE 802.11
Data rate	24 Mbps
Radio range	100 meter
Mobility model	accidental waypoint model
Antenna	Omni directional antenna
Node speed	10-35 m/s
Packet size	512 bytes
Traffic type	CBR

Table 1: Simulation parameters

The findings of the simulation of the proposed work are explained in this section. We conducted overall simulation tests to assess the results. First, we used cluster forming in MANET with PSO and MANET with the use of CMBCH, the already existing clustering algorithms, We introduced. And compared with these algorithms the efficiency of the proposed job. For our simulation job, we used NS2 network simulator[36]. The number of nodes ranges between 20 and 100 to evaluate our proposed algorithm. Simulation area of 750 m/750 m is used for the deployment of nodes. As is understood, a node never reaches step N, p = q being equivalent to where a mobile spends the same amount of time sleeping and working. Different traffic-loading simulation effects are derived

The transmitting range of nodes ranges between 10 and 100 m, with initial energy of 6000 joules initialised (NJ). The simulation parameters in Table 2 have been summarised. In terms of cluster shifts, the simulation findings demonstrate how effective TID-CMGR is compared to PSO and CMBCH. Compared with the other algorithms the TID-CMGR is gives a better relation with No of nodes and cluster head changes ratio. In the other algorithm no of nodes increased the ratio of the cluster head also increased, in our proposed algorithm gives a better results compared with other algorithm as shown in Figure 6. Figure 6 shows the amount of changes in cluster head and the time to update is taken. Compared to TID BRM, CMBCH and PSO, TID CMGR indicates a minimum time consumption.

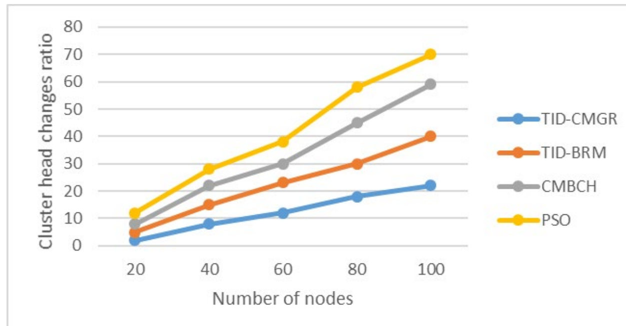

Figure 6 number of nodes vs cluster head changes

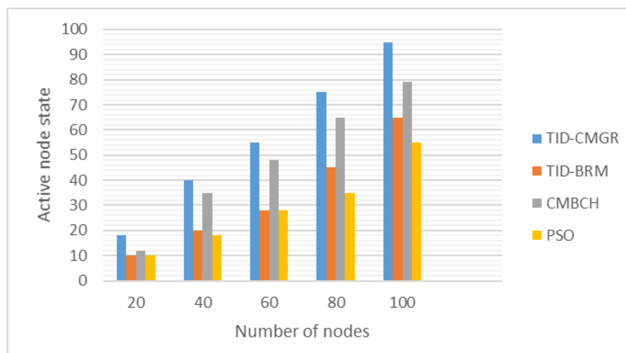

Figure 7 number of nodes vs active node state

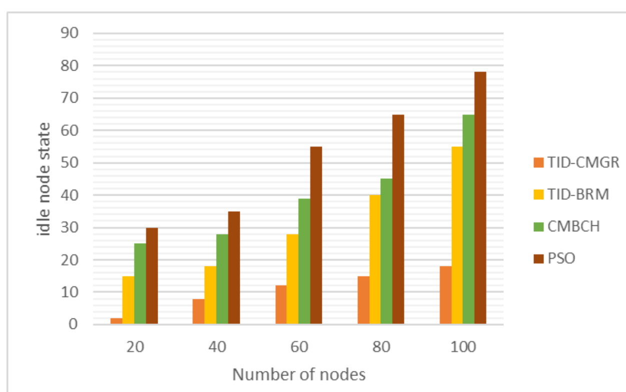

Figure 8 number nodes vs idle node state (sleeping)

Figure 7 and 8 shows the plot of the no of nodes versus idle and active node states, Figure has shown that there is less delay than PSO and CMBCH in the proposed algorithm. If the no of nodes reached the 100 the idle state level is 80 in PSO and nearly 20 for our proposed and the active node state, the proposed TID CMGR gives best results compared with other algorithm

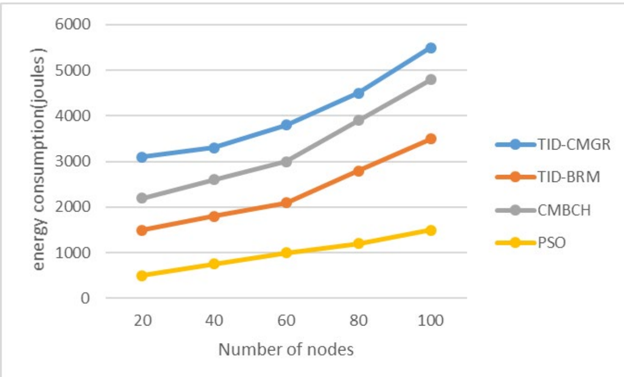

Figure 9 number of nodes vs energy consumption

Figure 9 illustrates the average energy consumed by the TID-CMGR, TID-BRM, CMBCH and PSO algorithms. The X-axis states the average energy consumed by each algorithm, and Y-axis states the total number of nodes taken part. At each stage, the number of nodes increases gradually with 20 nodes. The average energy consumption is calculated in the aspect of Joules. The high PDR, minimum end to end delay, and routing overhead result in minimum energy consumption. In which the proposed TID-CMGR achieves packet transmission every 20 nodes as shown in figure. The overall average energy consumption attained by TID-CMGR is calculated from the graph, This performance shows energy consumed at each stage in comparison to others. Figure 6 shows energy consumption of other approaches for increasing the number of nodes by the proposed algorithm. The average energy absorbed per second by the node after the simulation is generally determined. Effective transformation capabilities are provided for in the proposal, as robust routing and a minimum network loss allow data transmission with minimum energy usage.

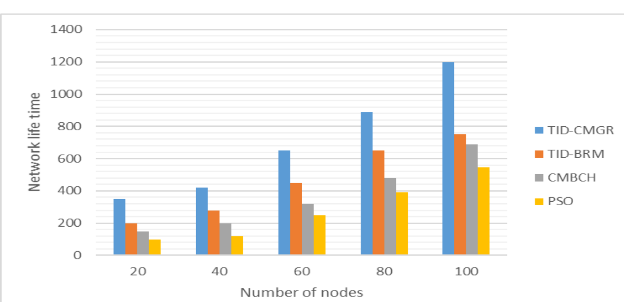

Figure 10 number of nodes vs network life time

Figure 10 finally reveals the efficiency of the proposed network existence algorithm. This is a key output parameter identified by different researchers in numerous ways, including the period before the death of the first CH or the death of a number of CHs in the network.The above shown colored bar diagram gives the exact network life time with no of nodes for each algorithm, from that the nodes are increased the network life time was increased, compared with other algorithm TID CMGR gives a better results in higher nodes and the nodes are gradually increased from 20 nodes to 100, in the 100th node the network life time in our proposed algorithm gives maximum compared with other algorithm like PSO, CMBCH and TID BRM.

5. conclusion

In this study, we suggested an approach to the clustering of industrial, dynamic MANET's, which ensures that power consumption can be minimized. In this approach, we have taken a further more sophisticated approach than conventional clustering solutions and choosing the CH. Other parameters that affect network reliability considerably are taken into account in the proposed algorithm. The findings show clearly that the proposed algorithm of TIDCMGR for clustering will effectively control power consumption between clusters and Cluster managers. The proposed system addressed the multipath routing protocol complexities and overhead issues. The ticket-ID CMGR mechanism overcomes these issues and balances the traffic effectively. The ticket-ID manager plays a vital role in the mechanisms, and overall performance occurs under its supervision. The TID CMGR examines the nodes factor, and based on the obtained value; the neighbor nodes are selected for transmission. Another component, route maintenance, delivers the optimal routing path, which is described in the algorithms. In comparison with TIDBRM, CMBCH and PSO, the accuracy of the proposed protocol is assessed.

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