IJCSE International Journal of Computer Sciences and Engineering Open Access
Research Paper Vol.-6, Issue-12, Dec 2018 E-ISSN: 2347-2693

Controlling Congestion by using Cluster Routing as a Gateway in WSN

Anamol Chand Jain[1*], Ashendra Kumar Saxena[2]

[1]College of Computing Science & Information Technology, Teerthanker Mahaveer University, Moradabad. India
[2]College of Computing Science & Information Technology, Teerthanker Mahaveer University, Moradabad. India

[*]*Corresponding Author: acjmcs@gmail.com, Tel.: +91-9918841808*

Available online at: www.ijcseonline.org

Accepted: 22/Dec/2018, Published: 31/Dec/2018

Abstract: For extending the lifespan of a wireless sensor network we apply a well-known technique known as cluster. In this technique we select cluster chiefs (CC) which are responsible for routing and regulate liabilities and this technique continuously interchanges the role of dispersed energy ingestion between nodules. As the main objective is saving energy so that throughput, packet delivery ratio strengthens and end-to-end delay may decrease. For this purposes sensory nodules are organised in such a way so that it may sense, calculate, and interconnect warnings in a WSN for prevention of gateway overcrowding. Cluster founded procedure is favoured because usual transportation methods consumes extra energy in sensing and calculating. For the purpose of preserving energy and to escape overcrowding throughout in multiclass traffic flow a novel approach for governing overcrowding on gateway is used. In which nodules are structured dynamically into clusters to offer whole exposure and connectivity. It calculates overcrowding. There is a suitable queue model in each mobile nodule inside the cluster for scheduling prioritized packet for the period of overcrowding without drop or delay. Simulation results shows that throughput, packet delivery ratio strengthens and end-to-end delay are decreases in comparison with other existing phenomenon.

Keywords **-** Cluster, Routing, gateway, packet delivery, throughput and end-to-end delay.

I. INTRODUCTION

WSNs comprise of sensory nodules with sensing and communiqué skills that have grown massive consideration for their utilizations in numerous presentations [1, 2]. Utmost wirelesses sensory are driven with batteries as partial energy bases. In accumulation, non-renewable energy bases powerfully need diminishing energy ingesting of the nodules and then exploiting net lifespan. So, a surplus study has attentive on energy preservation of sensory nodules in extended tasks of WSNs. It is considered an effectual method of saving energy ingesting of the sensory nodules. In this methodology, sensory nodules are assembled into clusters. One of the nodules is chosen as chief of clusters, it leads all clusters, and the rest of nodules contained by the cluster are deliberated as cluster participants. Sensory nodules sense the physical factors associated to their atmosphere and send the info to their equivalent cluster chiefs. Cluster chiefs then collective the data and refer it to an isolated base station (BS) or basin using single-hop or multi-hop that is subject to on the remoteness of the BS.

Numerous cluster-founded routing methods can be originated in where episodic CC selection and re-clustering is accomplished. In maximum of these methods, cluster chiefs are selected either individually or grounded on race of diverse weight utilities [3, 4]. Alike cluster creations are followed by a linking memo, either to a near cluster chief or to a cluster chief with a greater enduring energy [5, 7]. This can equilibrium the energy ingesting of the nodules but does not guarantee the enlargement of the stable state that is the time the leading nodule expires in the net and the net period as well. Since only the remaining energy of a nodule is one of the main conditions to cluster chief choice, not seeing the usual space from participant nodules does not promise that the energy ingesting of the nodes is kept for the period of intra-cluster communiqué. Furthermore, episodic cluster-chief selection and re-clustering procedures of the modus operandi need the propagation of regulator memorandums in every rotund, which is the energy excess of the power-limited sensory nodules. One resolution is to piggyback the load worth of the nodules with the native data referred to a cluster chief to hand over the part [6, 7]. Consequently, the sum of regulator messages is reduced concerning the cluster-chief selections during the network lifespan.

1.1 CLUSTER-BASED NETWORK STRUCTURE

The machineries are operational on for every cluster origins. Clustering is a way for mutually organised a quantity of nodules. Commonly, one nodule between the cluster associates is chosen to be the cluster leader or cluster chief. The cluster chief shows the character of the chief controller

dependent on the mission that the clustering procedures intended to sustenance. Clustering in adhoc nets has been useful for routing, load harmonizing and for associate safety [8-12]. In sensory nets it was revealed that clustering for data gathering and data combination is extremely operational in preserving energy and extending the net lifespan[13,14].

1.2 WHAT IS CLUSTERING TECHNIQUE?

We mostly utilise cluster and clustering words in computer netting to mention to an amount of diverse applications of common computing assets .Characteristically, a cluster assimilates the assets of two or additional calculating policies that could then job independently, together for certain mutual determination. Clustering of wireless net nodules into sets with appropriate cluster chief collection will execute a steady arrangement in the net and makes it probable to assurance elementary stages of organisation presentation such as throughput and delay, even in the existence of movement, energy means and a big amount of movable nodules. Though, movement and energy means are not main concerns in organisation WMNs. Cluster procedures might be utilised in cultivating databank admittance and network presentation. The net presentation metrics such as routing delay, bandwidth ingesting, energy ingesting, throughput, and scalability are greatly enhanced with suitable clustering methods. A clustering procedure breaches the net into disconnect groups of nodules, all positioning on a selected cluster-chief [15]. Some well-known clustering procedures are:

1.2.1 Highest-Degree heuristic

The Highest-Degree, also identified as connectivity-founded clustering, was primarily in which the ranking of a nodule is deliberate grounded on its remoteness from others. Each nodule announces its id to the nodules that are privileged its communiqué region. A nodule *x* is deliberated to be adjoining of a different nodule *y* if *x* lies inside the communication zone of *y*. The nodule with supreme amount of adjoining nodules is selected as a CC and any bond is cracked by the distinctive nodule ids. The adjoining nodules of a CC come to be memberships of that cluster and can no longer contribute in the selection procedure [16]. As no CCs are straight connected, single one CC is permitted per cluster. Some two nodules in a cluster are utmost two-hops away meanwhile the CC is straight connected to every of its adjoining nodules in the cluster. Fundamentally, each nodule either becomes a CC or leftovers a normal nodule (adjoining nodules of a CC). Research show that the organisation has a small rate of CC alteration but the throughput is small in the Highest-Degree heuristic [17]. Usually, every cluster is allotted certain means which are pooled amongst the fellows of that cluster on a round robin base. As the amount of nodules in a cluster is amplified, the throughput falls and therefore a slow deprivation in the organisation presentation is witnessed. The re-association amount of nodules is great because of nodule actions and as an outcome; the highest-degree nodule might not be re-chosen to be a CC even if it frees one fellow citizen. Altogether these weaknesses take place as this way does not have several constraints on the higher bound on the amount of nodules in a cluster.

1.2.2 Lowest-ID heuristic

The Lowest-ID is acknowledged as recogniser founded clustering. This investigative allocates a distinctive id to every nodule and selects the nodule with the smallest id as a CC. Thus, the ids of the adjoining nodule of the cluster chief will be greater than that of the cluster chief. Though, the cluster chief can illustrative its duty to the subsequent nodule with the least id in its cluster. A nodule is termed a gateway if it lies inside the communication series of two or more CC. Gateway nodules are normally utilised for routing amongst clusters. Only gateway nodules can attend to the dissimilar nodules of the overlying clusters that they lay. The idea of dispersed gateway (DG) is also utilised for inter-cluster transmission merely when the clusters are not overlying. DG is a couple of nodules that lies in diverse clusters but they are inside the communication series of every additional. The key benefit of dispersed gateway is preserving associativity in circumstances wherever some clustering procedure miscarries to afford associativity. For this investigative, the organisation presentation is well matched with the Greatest-Grade investigative in expressions of throughput. Meanwhile the surroundings beneath attention is movable, it is not likely that nodule grades persist steady resultant in recurrent cluster chief updates. Though, the weakness of this investigative is its prejudice to nodules with minor identifications which might top to the battery drainage of assured nodules. One may consider that this problematic might be secure by re-numbering the nodule ids from time to time, which is yet non-trivial. There are additional difficulties related with such re-numbering. For example, the optimum occurrence of re-numbering would must to be resolute so that the organisation presentation is take full advantage of. More prominently, each time nodule ids are reorganised, the adjoining list of entirely the nodules wants also to be altered. If we deliberate that the nodules are come to in the growing direction of their left over battery power, then a consolidated procedure is mandatory. We can evade this by swapping identifications amongst nodules and creating guaranteed that the distinctiveness of identifications is preserved. Even formerly, the clustering has to be recreated which would enhance needless computational difficulty to the organisation. For instance, assume two nodules jointly interchange their identifications in directive to retain the ids permitting to their lasting battery power. This influence might broadcast and add overhead to the organisation. Furthermore, it does not try to equilibrium the weight consistently crossways wholly the nodules.

1.2.3 Distributed Clustering Algorithm

The Distributed Clustering Algorithm (DCA) is appropriate for clustering ad hoc nets, in which nodules adopts quasi-

static or touching at a very small speediness. DCA utilises masses related with nodules in choosing cluster chiefs. The DCA creates a supposition that the net mathematics does not alteration throughout the implementation of the procedure. A nodule delays for altogether its adjoining node with greater masses to choose to be CCs or link current clusters. Nodules holding the utmost masses in their one-hop communities are chosen as CCs. When a nodule takes several CC proclamations, it determines amongst these CCs using a favourite situation. If nothing of the higher-weight adjoining nodule of a nodule chooses to become a CC, then this nodule agrees to convert a CC. The procedure is completely dispersed and effective, as it shows certain countless structures that make it measure big enough for WSN. It experiences very restricted bandwidth rate meanwhile every nodule transmissions only, and merely single, memo. This latter is referred when the nodule decides its cluster, afterward; the procedure halts [19]. The repetitive methods practise the problematic of merging speediness which is reliant on the net width. Although sluggish repetition merging speeds, the presentation of repetitive methods is also extremely thoughtful to packet harms.

1.2.4 Weighted Clustering Algorithm

The Weighted Clustering Algorithm selects a node founded on the amount of adjoining node. The process takings into deliberation the quantity of nodules a CC can handle perfectly deprived of some simple deprivation in the presentation, communication power, movement, and battery-operated power of the nodules. Distinct to further surviving arrangements which are appealed intermittently resultant in great transmission overhead; the procedure is familiarised entreated grounded on the movement of the nodules [20, 21]. Calculation charge is condensed by CC selection process as extensive as probable while weight harmonising is attained by identifying a pre-distinct threshold on the quantity of nodules that a CC can efficiently holder. While this assurances that no one of the CCs are burdened at some occurrence of period, the load balancing factor (LBF) to measure the grade of weight harmonising amongst the CCs is produced as a presentation metrics. This procedure assistances to regulator overcrowding; though, nodule movement calculation will harshly disturb the excess charge and might even present massive circulation that might reason overcrowding in WSNs.

1.2.5. AODV-Based Cluster Routing

As our net's scope grows, nodule grade also upsurges respectively, foremost to overcrowding in the net because AODV procedure directs several packets in contrast to additional responsive procedures. Clustering decreases this by local route detection and conservation. This mechanism is utilised by Cluster- AODV to lesser routing overhead and permits accessibility even though confirming decent packet distribution quotient. . The advised Cluster AODV outline utilises clustering design and AODV operational for routing.

1.2.6 Intra-cluster routing

Each nodule has routing information on its cluster. Routing within a cluster is known as intra-cluster routing. While a nodule absences a path to a target that is in the cluster it directs a Local Route Request (LRREQ). When route miscarriages confirm absence of response to a RREP, native path repairs is assumed inside a cluster.

1.2.7 Inter-cluster routing

Routing among clusters is called Inter-cluster routing. The CC has a 2-hop cluster mathematics also keep up in a SCH to lessen one point of miscarriage. Ordinary nodules are not engage in RREQ packets in inter-cluster transmission. When routes may not be bring into being in a cluster once a LRREQ memo has be there allotted, a CC utilises a RREQ memo to find a target via a gateway to 2-hop neighbour clusters. To lessen RREQ overflowing packet surpluses merely gateways and CCs advances the RREQ.

1.2.8 Route maintenance

At what time LRREQ miscarries, an AODV process is utilised and the normal RERR is advanced to basis nodules on behalf of way rebuilding. Alike to route conservation, to cluster conservation begins when a track flops in a cluster and is re-created in the neighbourhood utilising LRREQ and RREQ with 2-hop topology info. The basis nodule follows the similar practice to overhaul unsuccessful paths, first close by and then others. When CCs interchange locality's info with cluster participants, a new nodule nearby may list with a CC by utilising a RREQ memo. The methods connecting a new nodule which links and a present nodule leaving are passed out founded on hello memos from AODV. When a nodule drives away from the current CC, as it will be detached from the ancient CC and ancient associates' routing records are restructured consequently so it changes its character to that of a normal nodule, a gateway or will be unsure [22].

The best routing procedure to suit for energy constrained network is cluster based routing procedures. When compared to the conventional routing procedure, cluster based procedures reduce energy dissipation by many times. These procedures establish the nodules into clusters. Every cluster has one designated nodule called cluster chief (CC) which is liable for gathering data from its cluster members (CM) and transmits it to the BS. The number of clusters depends upon the application. There should be optimum number of clusters. According to the nodules behaviour, WSNs can be categorised as static or mobile. When compared with mobile nodules static nodules have several drawbacks [23, 24]. It is difficult to provide guaranteed optimal coverage using static nodes. Static failure nodule always hinders the communication in the network, which in turn affects connectivity and network quality. Network overcrowding can be avoided either by increasing link capacity or by controlling data rates [25–28]. As the nodules

move around the network, the number of packets to be routed to the BS varies drastically. This may cause overcrowding in the network, which results in packet loss. Time sensitive applications need data to be routed immediately without delay; otherwise the data will become useless.

For effectual gathering of data from all the nodules of the net, the nodules are assembled in such a fashion that every collection has a partial amount of nodules that senses the data from surroundings [29].

Sensory nodules are arranged in the request particular atmosphere. For the period of positioning they are allotted with the similar vitality side by side and with matchless id. Every nodule keeps up a routing table that encloses info around its adjacent nodules [30].

II. PROPOSED MODEL

Our suggested method will fulfil following objectives:

(i) An appropriate queue model is designed in every nodule to evade highlighted packet fall or delay for the duration of overcrowding.

(ii) To provide complete coverage and connectivity, mobile nodes are introduced and they are organized into clusters dynamically to minimize energy consumption.

(iii) To reduce packet drop and to provide a high packet delivery ratio, overcrowding is computed at intra and inter cluster level using linear and binary feedback methods, respectively.

The suppositions made for the system plan are shown further down.

(i) Every cluster should have only single CC. So the quantity of CHs every time defines the quantity of clusters.

(ii) CMs are skilled of amending their broadcast power in order to reach their relevant CC for the period of a particular round.

(iii) Nodules are positioned arbitrarily in the sensory arena with an identical set of energy level.

(iv) BS is all the time located outer the sensing arena which is movable in nature and has the maximum energy when equated with every other nodules in the WSN.

(v) Nodules are permitted to travel around the sensing arena at unlike speediness to offer essential attention and connectivity.

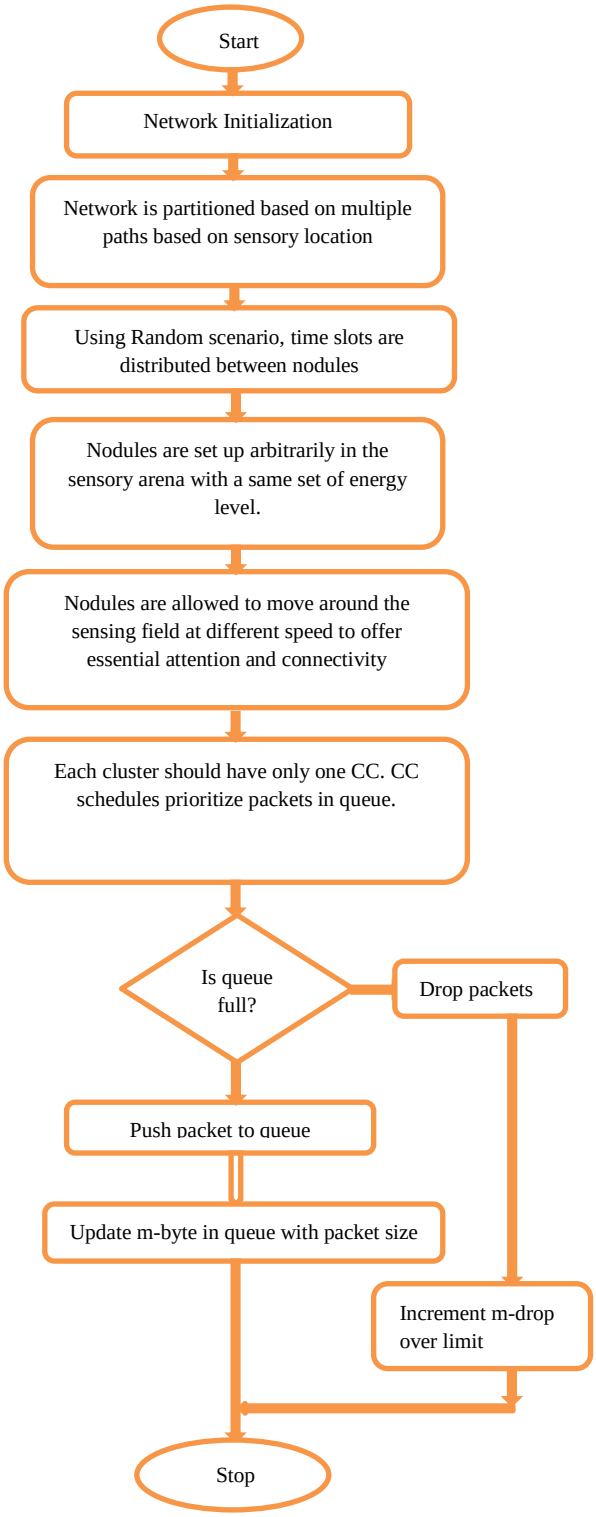


Figure.1

III. EXPERIMENTAL SETUP AND DISCUSSION

Our experimental setup is given as-

OS – VM Ubuntu 16.04 LTS
RAM – 4.0 GB
OS Type – 64 bit
NS: stands for Network Simulator.
NS package- ns-allinone-2.35
Network: A collection of various inter linked nodules.
Simulator: A package or devoted scheme which replicas some features of physical existence in organised situation. So network simulant is a recreation tool which mimics the network construction, procedures, and their working.

For simulation we utilised NS - 2.35 simulators (ns-allinone-2.35) using Ubuntu 14.04 LTS as O.S. and discovered relative study which enhances a capable energy in net.

3.1 Performance Evaluation:

We utilised 2nd version of net simulator to put on the presented procedure. NS2 is a network simulator that is broadly applied in wireless atmospheres. The topology applied in our simulation is a random topology with random drive prototypical where nodules are situated at a random place inside the simulation area. The simulation limits applied are told below.

3.2 Performance Metrics:

The demonstration of the way is measured using the metrics given below:

3.2.1 Packet Delivery Ratio (PDR):

It is the quantity of the overall packets acknowledged successfully in the Base Station divided by the whole packets formed in the bases.

3.2.2 End-to-end delay:

it is the mediocre time variance between the packets directed by the basis nodule to the packet received by the base station.

3.2.3 Throughput:

It is represented as data packets delivered in per second; it is an important pointer of the presentation and eminence of the network**.**

MAC/TDMA has been applied in NS2. The simulation focuses on the data communiqué efficiency. The presentation of MAC/TDMA is also measured here.

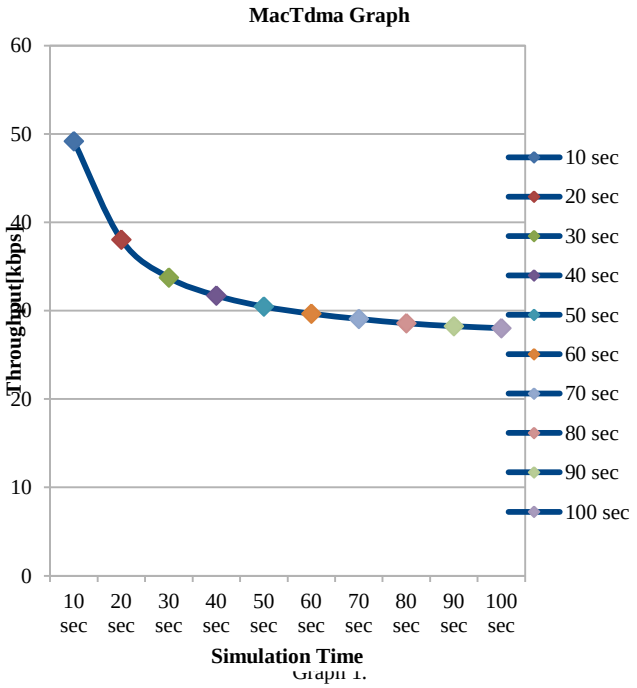
Table.1

S. No.	Parameters	Values
1	Channel type	Channel/Wireless Channel
2	Radio-propagation model	Propagation/Two Ray Ground
3	MAC type	Mac/ Tdma
4	Interface queue type	Queue/Drop Tail/Pri Queue
5	Antenna model	Antenna/Omni Antenna
6	Max packet in ifq	50
7	Number of mobile nodes	30
8	Routing Protocol	AODV
9	Simulation Area (X)	500
10	Simulation Area (Y)	500
11	Simulation Time (Sec)	10,20,30,40,50,60,70,80,90,100
12	Agent	TCP
13	Application	FTP
14	Energy model	Energy Model
15	Transmission Range (m)	250
16	Initial energy in Joules	100
17	For mobility file parameter pause time in Sec	2
18	Packet Size(Kbps)	512
19	Interval(ms)	100

Table.2 Simulation Node 30

Simulation Time(Sec)	Throughput[kbps]	Packet Delivery Ratio (%)	End to End Delay (ms)
10	49.18	79.7279	34.1835
20	38.04	72.8318	129.6589
30	33.75	68.6275	230.1542
40	31.71	65.7307	326.9274
50	30.47	63.6307	427.4227
60	29.66	62.0121	527.918
70	29.07	60.7371	628.4133
80	28.58	59.7154	728.9086
90	28.25	58.8641	829.4039
100	28.02	58.1499	926.1771

In table.2 simulation is implemented on 30 nodes for different time slots each with 10 sec. interval and found respective result of throughput, packet delivery ratio and end to end delay as above.



Graph 1.

In this graph.1 throughput in MAC TDMA with respect to various increasing time slots is decreases.

Table.3

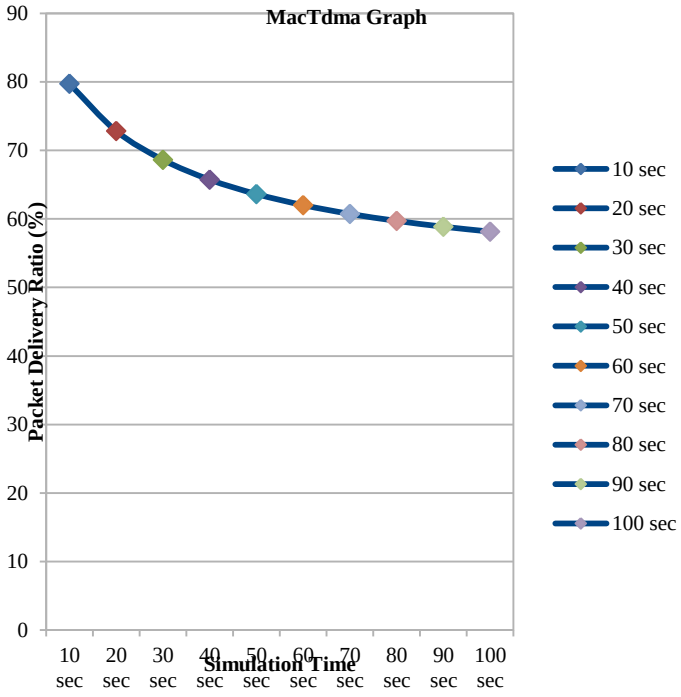
Simulation Time	Throughput[kbps]
10 sec	49.18
20 sec	38.04
30 sec	33.75
40 sec	31.71
50 sec	30.47
60 sec	29.66
70 sec	29.07
80 sec	28.58
90 sec	28.25
100 sec	28.02

In this table simulation is done based on time 10, 20, 30, 40, 50, 60, 70, 80, 90 and 100 seconds respectively and found that as time increases the throughput is decreases.

Table.4

Simulation Time	Packet Delivery Ratio (%)
10 sec	79.7279
20 sec	72.8318
30 sec	68.6275
40 sec	65.7307
50 sec	63.6307
60 sec	62.0121
70 sec	60.7371
80 sec	59.7154
90 sec	58.8641
100 sec	58.1499

In table.4 simulation is implemented on 30 nodes for different time slots each with 10 sec. interval and respective result of packet delivery ratio are found as above.



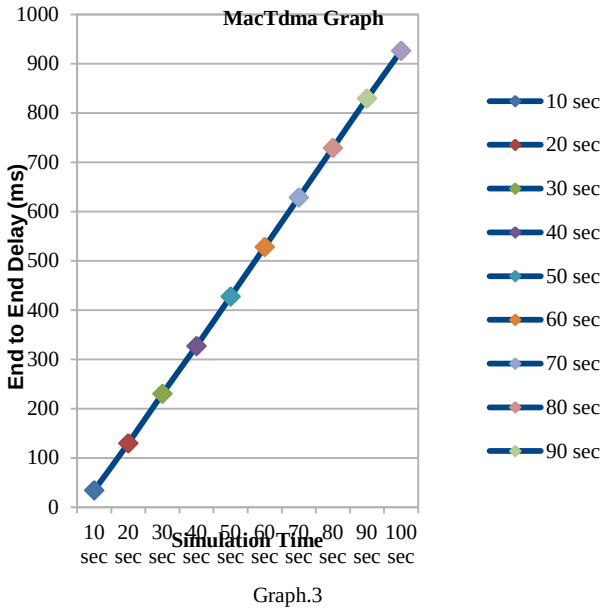
Graph.2

In graph.2 above simulation is implemented for different time slots each with 10 sec. interval and found respective result of packet delivery ratio. We can see here that graph is downwards as time increases.

Table.5

Simulation Time	End to End Delay (ms)
10 sec	34.1835
20 sec	129.6589
30 sec	230.1542
40 sec	326.9274
50 sec	427.4227
60 sec	527.918
70 sec	628.4133
80 sec	728.9086
90 sec	829.4039
100 sec	926.1771

In table.5 we can see that end-to-end delay increases as time slot of simulation increases.



Graph.3

This graph 3 depicts the results of table 5 we can see here that as the simulation time increases likewise end-to-end delay increases.

Table.6

Nodes	Throughput [kbps]	Packet Delivery Ratio (%)	End to End Delay (ms)
30	49.18	79.7279	34.1835
40	46.69	85.8304	22.8212
50	87.69	93.775	8.3992
60	134.33	95.2546	10.0072

In this phase the simulation work is done based on number of nodules, here 30, 40, 50, 60 nodules have been taken, based on which the respective results of Throughput, Packet Delivery Ratio and End-To-End delay found as given below.

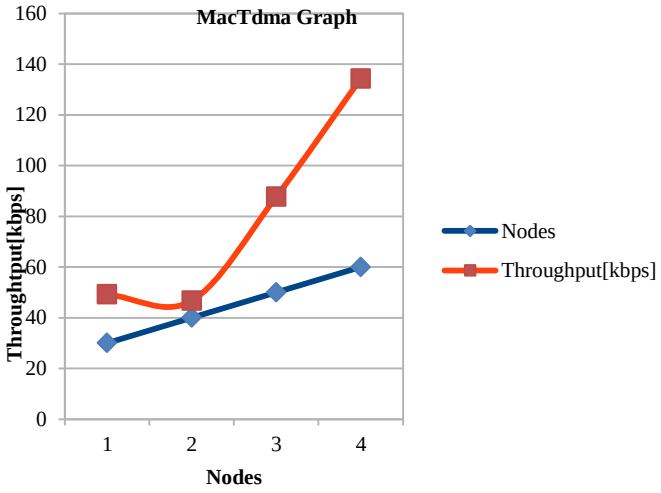


Table.9

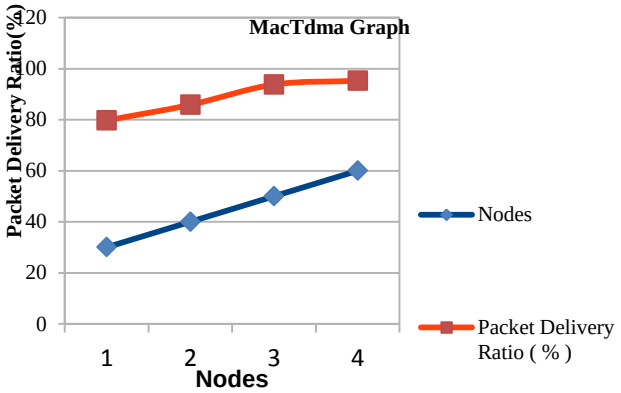
Nodes	Packet Delivery Ratio (%)
30	79.7279
40	85.8304
50	93.775
60	95.2546

Table.9 shows the packet delivery ratio with respect to number of nodes which is increases as the number of nodes increase.

Table 7		
S. No.	**Parameters**	**Values**
1	Channel type	Channel/Wireless Channel
2	Radio-propagation model	Propagation/Two Ray Ground
3	MAC type	Mac/Tdma
4	Interface queue type	Queue/DropTail/PriQueue
5	Antenna model	Antenna/Omni Antenna
6	Max packet in ifq	50
7	Number of mobile nodes	30, 40, 50, 60
8	Routing Protocol	AODV
9	Simulation Area (X)	500
10	Simulation Area (Y)	500
11	Simulation Time (Sec)	10
12	Agent	TCP
13	Application	FTP
14	Energy model	Energy Model
15	Transmission Range (m)	250
16	Initial energy in Joules	100
17	For mobility file parameter pause time in Sec	2
18	Packet Size(Kbps)	512
19	Interval(ms)	100

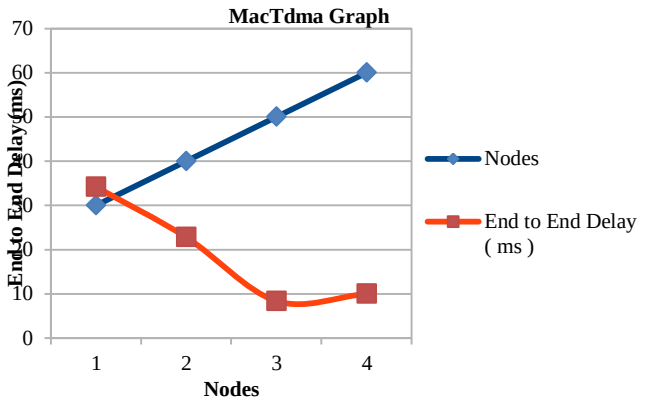
Table.8

Nodes	Throughput[kbps]
30	49.18
40	46.69
50	87.69
60	134.33



Graph 6

Table.8 shows the throughput results of 30, 40, 50 and 60 nodes respectively as number of nodes increases, throughput increases.



Above graph.5 depicts that with the increase in number of node Packet Delivery Ratio increases.

Table.10

Nodes	End to End Delay (ms)
30	34.1835
40	22.8212
50	8.3992
60	10.0072

From Table.10 and Graph.6 it is clear that after a limit in increase of node End-To-End Delay increases, here in graph below up to 50 nodes it decreases and when nodes are 60 it increases.

In Table.12 below Throughput, Packet Delivery Ratio and End-To-End Delay is monitored with respect to Packet Size.

In Table.11 below parameters are taken with respect to packet size.

Table.11

S. No.	Parameters	Values
1	Channel type	Channel/WirelessChannel
2	Radio-propagation model	Propagation/TwoRayGround
3	MAC type	Mac/Tdma
4	Interface queue type	Queue/DropTail/PriQueue
5	Antenna model	Antenna/OmniAntenna
6	Max packet in ifq	50

7	Number of mobilenodes	30
8	Routing Protocol	AODV
9	Simulation Area (X)	500
10	Simulation Area (Y)	500
11	Simulation Time (Sec)	10
12	Agent	TCP
13	Application	FTP
14	Energy model	EnergyModel
15	Transmission Range (m)	250
16	Initial energy in Joules	100
17	For mobility file parameter pause time in Sec	2
18	Packet Size(Kbps)	512, 1024, 2048, 4096
19	Interval(ms)	100

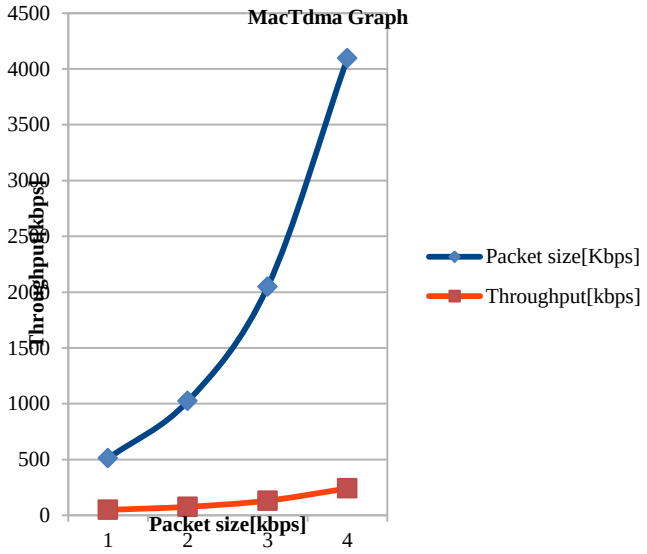
Table.12

Packet size[Kbps]	Throughput [kbps]	Packet Delivery Ratio (%)	End to End Delay (ms)
512	49.18	79.7279	34.1835
1024	76.63	79.7279	34.2327
2048	131.51	79.7279	34.331
4096	241.29	79.7279	34.5276

In Table.13 and Graph.7 below it is clearly depicted that with the increment in Packet size the Throughput increases.

Table.13

Packet size[Kbps]	Throughput[kbps]
512	49.18
1024	76.63
2048	131.51
4096	241.29

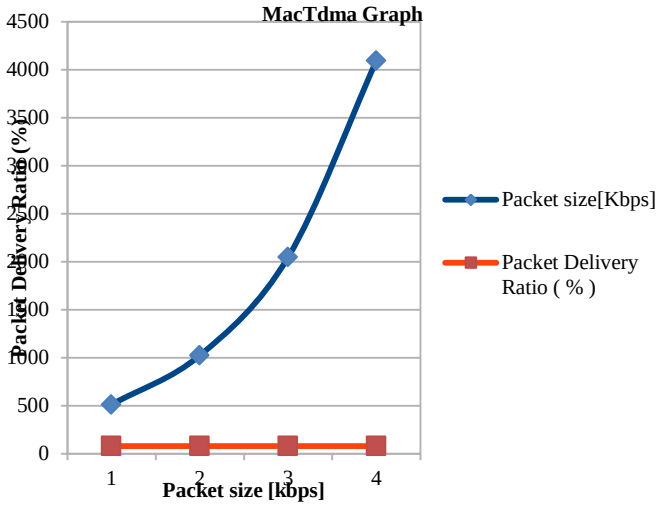


Graph.7

Table.14

Packet size[Kbps]	Packet Delivery Ratio (%)
512	79.7279
1024	79.7279
2048	79.7279
4096	79.7279

Here from Table.14 and Graph.8 we can conclude that with the increment of Packet size Packet Delivery Ratio does not changes it remains constant.

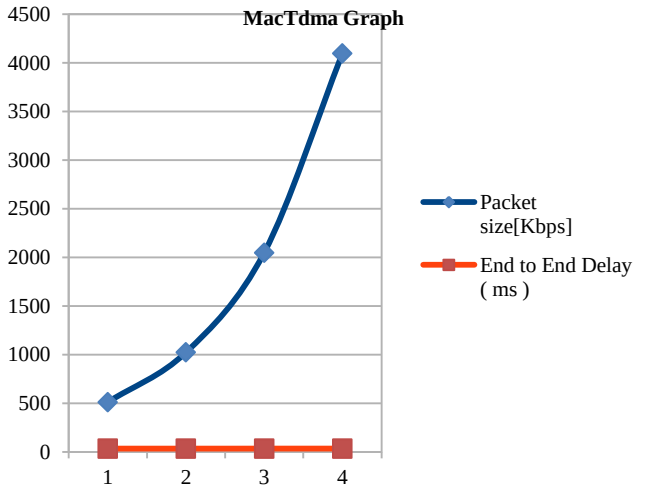


Graph 8

Table.15

Packet size[Kbps]	End to End Delay (ms)
512	34.1835
1024	34.2327
2048	34.331
4096	34.5276

In Table.15 and its Graph.9 clearly shows that increment in Packet size does not affect very much it remains almost constant.



Graph.9

IV. CONCLUSION

The proposed method provides better performance results for an efficient reliable gateway congestion control. To decrease energy ingesting, nodes are structured into clusters. In our method clusters have two parts, namely, setup part and data communication part. It allots precedence to actual packs, the amount of actual packets getting fallen throughout overcrowding is abridged significantly because it tackles overcrowding at together intra- and inter cluster level individually. A suitable queue prototypical in Cluster Chiefs also evades packet fall due to overcrowding. Here actual packets are taken after non-actual packets overdo the threshold boundary. This reduces the amount of actual packets being created. Since actual packets are time stamped, they are talked rapidly to Base Station to provide greater packet supply ratio. It also upholds exposure trustworthiness to approve that packets approaching from distant off nodes and with more sense worth are transported instantly to evade getting fallen. The offered procedure decreases the energy ingesting but at the same time experiences a minor time interruption due to dynamic clustering for the duration of crisis conditions. During usual condition CCs only contribute in data communication to Base Station and in serious condition data can be communicated over a least amount of nodules which are neighbouring the occurrence.

REFERENCES

[1] J. Rezazadeh, *"Mobile wireless sensor networks overview,"* International Journal of Computer Communications and Networks, vol. **2,** no. **1**, pp. **17–22, 2012**.

[2] R.Velmani and B. Kaarthick, *"An efficient cluster-tree based data collection scheme for large mobile wireless sensor networks,"* IEEE Sensors Journal, vol. **15**, no. 4, pp. **2377–2390, 2015.**

[3] J.Zhao, L.Wang, S. Li, X. Liu, Z. Yuan, and Z. Gao, *"A survey of congestion control mechanisms in wireless sensor networks,"* in Proceedings of the 6th International Conference on Intelligent Information Hiding and Multimedia Signal Processing (IIHMSP '10), Darmstadt, Germany, pp. **719–722**, October **2010.**

[4] M. A. Kafi, D. Djenouri, J. Ben-Othman, and N. Badache, *"Congestion control protocols in wireless sensor networks: a survey,"* IEEE Communications Surveys and Tutorials, vol. **16**, no. **3**, pp. **1369–1390, 2014**.

[5] C.Sergiou, P. Antoniou, and V.Vassiliou, *"A comprehensive survey of congestion control protocols in wireless sensor networks,"* IEEE Communications Surveys and Tutorials, vol. **16,** no. **4**, pp. **1839–1859, 2014.**

[6] J. Kaur, R. Grewal, and K. S. Saini, *"A survey on recent congestion control schemes in wireless sensor network,"* in Proceedings of the IEEE International Advance Computing Conference (IACC '**15**), IEEE, Banglore, India, pp. **387–392**, June **2015**.

[7] Al-Fuqaha, A.; Guizani, M.; Mohammadi, M.; Aledhari, M.; Ayyash, M. *Internet of Things: A survey on enabling technologies, protocols, and applications*. IEEE Commun. SurveyTutor. **2347–2376, 2015, 17,.**

[8] Wu, J. *"Dominating-set-based routing in ad hoc wireless networks, Handbook of wireless networks and mobile computing"***, 425-450**, **2002.**

[9] Haas, Z. J. and Pearlman, M. R., "*The zone routing protocol",* Internet Draft, **1998.**

[10] Krishna, P., Vaidya, N. H., Chatterjee, M., and Pradhan, D. K., "*A cluster-based approach for routing in dynamic networks"*. SIGCOMM. Comput. Commun., Rev. **27, 2, 49-64, 1997.**

[11] Amis, A. D. and Prakash, R., "*Load-balancing clusters in wireless ad hoc networks"*, In Proceedings of the 3rd IEEE Symposium on Application-Specific Systems and Software Engineering Technology (ASSET), IEEE Computer Society, Washington DC**, 25** , **2000**.

[12] Bechler, M., Hof, H.-J., Kraft, D., Pahlke, F., and Wolf, L., *"A cluster based security architecture for ad hoc networks",* In Proc. of 23rd IEEE INFOCOM. Hong Kong**, 2393-2403**, **2004.**

[13]Heinzelman, W. R., Chandrakasan, A., and Balakrishnan, H., "*Energy-e_cient communication protocol for wireless microsensor networks"*, In Proc. of the 33rd Hawaii Int'l Conf. on System Sciences-Vol.e **8**. Hawaii, HI, **,** Pp. **8020, 2000.**

[14]Mhatre, V. and Rosenberg, C., "*Design guidelines for wireless sensor networks: Communication, clustering and aggregation"*. Ad Hoc Networks Journal **2, 45-63 , 2004.**

[15] Qin, Y.; Sheng, Q.Z.; Falkner, N.J.G.; Dustdar, S.; Wang, H.; Vasilakos, A.V., *"When things matter: A survey on data-centric internet of things*". J. Netw. Comput. Appl**, 64, 137–153, 2016.**

[16] Sarkar, A.; Murugan, T.S. *"Routing protocols for wireless sensor networks: What the literature says?"* Alex. Eng. J.**, 55, 3173–3183, 2016.**

[17] Pantazis, N.A.; Nikolidakis, S.A.; Vergados, D.D. *"Energy-efficient routing protocols in wireless sensor networks: A survey".* IEEE Commun. Surv. Tutor., **551–5912013, 15,**.

[18] Heinzelman,W.R.; Chandrakasan, A.; Balakrishnan, H. *"Energy-efficient communication protocol for wireless micro sensor networks"*, In Proceedings of the 33rd Annual Hawaii International Conference on System Sciences, Maui, HI, USA, 7 January; pp. **1–10, 2000**.

[19] Malathi, L.; Gnanamurthy, R.K.; Chandrasekaran, K. *"Energy efficient data collection through hybrid unequal clustering for wireless sensor networks"*. Comput. Electr. Eng**., 48, 358–370, 2015**.

[20] Gupta, V.; Pandey, R. *"An improved energy aware distributed unequal clustering protocol for heterogeneous wireless sensor networks"*. Int. J. Eng. Sci. Technol.**, 19, 1050–1058, 2016.**

[21] Mahdieh Sasan,Farhad Faghani, *"Using imperialist competitive algorithm in clustering of wireless mesh network,"***7**th Iranian Conference on Electrical and Electronics Engineering(ICEEE**2015**),August **2015**.

[22] Gerla and J.T.C. Tsai, "*Multicluster, mobile, multimedia radio network*", Wireless Networks **1(3**), pp.**255–265, 1995**.

[23] S.Muthuramalingam, R.RajaRam, Kothai Pethaperumal and V.Karthiga Devi, *"A Dynamic Clustering Algorithm for MANETs by modifying Weighted Clustering Algorithm with Mobility Prediction*" International Journal of Computer and Electrical Engineering, Vol. **2**, No. **4**, August **2010**

[24] S. Basagni, "Distributed Clustering for Ad Hoc Networks", *International Symposium on Parallel Architectures, Algorithms and Networks'*, Perth, pp. **310-315**, June **1999**.

[25] Prerna Malhotra, Ajay Dureja, *"A Survey of Weight-Based Clustering Algorithms in MANET"*, IOSR Journal of Computer Engineering (IOSR-JCE), Volume **9**, Issue **6**, **PP 34-40**, March-April **2013**.

[26] Chatterjee M., Das S. K. and Turgut D.*:"WCA: A Weighted Clustering Algorithm for Mobile Ad Hoc Networks".* Cluster Computing 5 (2), Kluwer Academic Publishers, Pp. **193–204**, **2002.**

[27] M. Chatterjee, S.K. Das and D. Turgut*, "An on-demand weighted clustering algorithm (WCA) for ad hoc networks,"* in: Proceedings of IEEE GLOBECOM **2000**, November, San Francisco, pp. **1697–1701, 2000**.

[28] S. Balaji and V. Priyadharsini, *"A Robust Cluster Head Selection Based On Neighbourhood Contribution and Average Minimum Power for MANETS"* ICTACT Journal on Communication Technology, Volume: **06**, Issue: **02**, June **2015**.

[29] A. Garg Et.Al., *" Cluster Formation based Comparison of Genetic Algorithm and Particle swarm Optimization Algorithm in Wireless Sensor Network*", International Journal of Scientific Research in Computer Science and Engineering, Vol.**5**, Issue.**2**, pp.**14-20**, April **2017**.

[30] Annlin Jeba S.V.,Gnana King D.R, *"Combining Trust with Authentication Information for Routing in Wireless Sensor Networks",* IJSRNSC, Volume-**6**, Issue-**5**, October **2018**.

Authors Profile

Mr. Anamol Chand Jain pursed Bachelor of Science from University of Lucknow, Lucknow in 1998, Master of Science in Mathematics from Lucknow University in year 2002 and Masters in Computer Applications from IGNOU, New Delhi in 2008. He is currently pursuing Ph.D. from CCSIT, TMU, Moradabad and currently working as Assistant Professor in Department of Computer Sciences, University ofLucknow, Lucknow since 2009. He has published more than 6 research papers in reputed national and international journals including UGC listed and conferences including IEEE and it'svery soon available online. His main research work focuses on Congestion Control in Computer Network. He has 10 years of teaching experience and more than 5 years of Research Experience.

Mr Ashendra Saxena pursued Bachelor of Science from MJP University, Bareily in 1995 and Master of Science in Mathematics from MJP University, Bareily in 1997, MCA in 2003 from UPTU Lucknow and Ph.D. from MJP University, Bareily in 1995. He is currently working as Associate Professor in CCSIT, TMU University of Moradabad, India since 2003. He is a senior member of IEEE. He has published more than 20 research papers in reputed international journals including Thomson Reuters (SCI & Web of Science) and conferences including IEEE and it's also available online. His main research work focuses on Computer Network, Optimization Technique, and Data Mining. He has 15 plus years of teaching experience and 12 years of Research Experience.

