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Node Weight Based Cluster Formation to Improve Route Stability in MANET

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***Abstract*:** In the recent year clustering in MANET has become a crucial research issue, because clustering can improve routing performance of wireless adhoc networks. Clustering is significant models to control the topology of the networks include different phases like cluster formation, cluster head selection, and cluster maintenance. It uses cluster head is important as the stability of the network depends on well-organized and resourceful. Cluster head selection in MANET where it is necessary to provide robustness in the face of topology changes caused by node motion, node failure and node insertion or deletion. In this paper proposed a new routing algorithm named Node Weight Based Cluster Formation (NWBCF). This proposed algorithm will execute based on the high potential score (Cluster Head) node and every cluster member node select above 30% of energy capacity nodes. The remaining nodes are removed from the cluster head region for find the path from source to destination to hop1, hop2 and so on until reach the destination. If the cluster head is will go for threshold, choose another high potential score node (above 30% of energy capacity) act as a cluster head until reach the destination.

***Keywords*:** Link Stability, MANET, Cluster Head, Cluster Weight, Broadcast.

I. INTRODUCTION

Clustering in MANET has become a most crucial research issue in modern research days, causes clustering can improve the system performance of MANET. Clustering has evolved as an important research topic in mobile adhoc network as it improves the system performance of large adhoc networks. Clustering is one of the approaches for regulation of the routing process. Clustering is a process that divides the network into nodes groups (separate group) called clusters. Each and every cluster has a cluster head as coordinator within the substructures. That divided the network into number of interconnected substructures is non static and unstable nature of the mobile nodes makes it difficult for the cluster formation and constrained resources restrict the determination of cluster heads for each and every cluster.

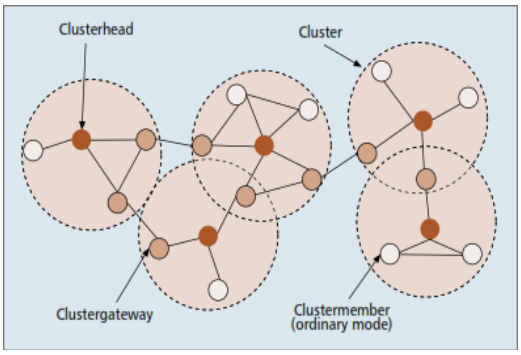

Figure 1 Clustering Structures.

In fig 1 clustering formation is a way to reconfigure all nodes into small virtual groups according to their regional vicinity and is defined as Cluster Head (CH) and cluster members that are determined with the same rule. Every clustering algorithm consists of two mechanisms: cluster formation and cluster maintenance. Thenode with the highest fitness is elected as the cluster head. In the fitness node, due to the weight group, cluster creation is done very quickly which causes network services to be more accessible. This service discovery is architecture based on clustering in the cluster-based service discovery protocol for MANET. It performs the cluster head selection by allotting a combined weight value based on the factors power level, connectivity and stability, intended for wireless MANET. It can be permitted to the switch over of service discovery messages only among the cluster members. It also considers the capabilities of the nodes for the distribution of workload. The Cluster Head (CH) is selected efficiently based on these factors like high transmission power, transmission range, distance mobility, battery power and energy. Although the cluster head will not be changed dynamically, the average number of cluster formations will be reduced. So the weights based cluster head election which can dynamically adapt itself with the ever changing topology of ad hoc networks. In this approach, the number of nodes is restricted to be catered by a cluster head. Thatit does not degrade the Medium Access Control (MAC) function and also has the flexibility of assigning different weights and takes into account a combined effect of the ideal degree, transmission power, mobility and batterypower of the nodes. They observed that all nodes have the same chance to participate in the cluster head selection process, which affects the quality of the formed clusters. Clusterstructure facilitates the spatial reuse of resources to increase the system capacity with the non-overlapping multi cluster arrangement, two clusters may arrange in the same frequency or code set if they are not neighboring clusters.

II. RELATED WORKS

A survey on various clustering algorithms for wireless sensor networks were discussed and analyzed by Abbasi, A.A., Younis, M (2007). A study on the topic broadcast expenses controlling techniques in mobile ad-hoc networks were discussed, analyzed and compared by Ahmad, N., Hussain, S.Z., (2015). Author have been proposed strategy to reduce the control packet load of AODV using weighted rough set model for MANET were analyzed by Aitha, N., Srinadas, R., (2009). Author have been Improvement to blocking expanding ring search for MANETS were discussed by Al-Rodhaan, M.A., Mackenzie, L., Ould-Khaoua, M., (2008). Limiting flooding expenses in on-demand source-initiated protocols for mobile wireless networks were discussed by Gargano, L., Hammar, M., (2004). Author have proposed cluster based controlling of route exploring packets in adhoc networks were discussed by Hussain, S.Z., Ahmad, N., (2014). Researchers cluster based Congestion Control for Supporting Multiple Classes of Traffic in Sensor Networks were discussed by Karenos, K., Kalogeraki, V., Krishnamurthy, S.V., (2005). Author have been proposed a new approach to geographic routing for location aided cluster based MANETs were discussed and analyzed by Senthil, Velmurugan, Mangai, (2011). DEMAC: A Cluster-Based Topology Control for Ad Hoc Networks were proposed and discussed by AbhishekMajumder, (2010). A Survey on One-Hop Clustering Algorithms in Mobile Ad Hoc Networks were studied and discussed by SuchismitaChinara, Santanu Kumar Rath. (2009). WACHM: Weight based adaptive clustering for large scale heterogeneous MANET were proposed, analyzed and discussed by Xi'an Jiaotong, et al. (2007). Stability-aware multi-metric clustering in mobile adhoc networks with group mobility were proposed, analyzed and discussed by Hui Cheng, et al. (2008). Cluster head Selection in Clustering Troy were studied by R.P. Yadav, (2008). A Modified Cluster Head were proposed, analysed and discussed by Haiyan and Haiying, (2008). An efficient clustering scheme for large and dense mobile adhoc networks (MANETs) were identified and analyzed by J. Y. Yu, P. H. Joo Chong, (2006).

III. PROPOSED CONCEPT

Network model: A graph G = (V, E) is used to model the adhoc networks in which V, E is a finite set of vertices and edges that connect the vertices (nodes). The nodes define number of elements in a particular set. That nodes of set V are constant, but the edges of set E is not constant, since it's depends on the nodes mobility. Clustering can be thought of as agraph partitioning problem with some added constraints. They underlying graph does not show any regularstructure, partitioning the graph optimally with respect to certainparameters. The neighborhoods of a cluster head the set of nodes which aredirectly linked to it and which are in fact the nodes lying within its transmission range. That is defines the degreeof the node.Every vertex of a graph G belongs to set S or neighbour in S to meet that requirements imposed by MANET nature. So clustering algorithm is required to partition into the number of nodes (subgroups) in the network and every ordinary node it hat at least one cluster head as neighbour.

Algorithm for Node Weight Based Cluster Formation (NWBCF).

// The following steps are to be executed in hop1, hop2 and so on until reach the destination.
Step 1: Start.
Step2: Clustering formation is within the transmission range based on the weight.
Step 3: Select the Cluster Head (CH) node based on the high potential score within the range.
Step 4: Each CH stores all information about its members, and all nodes record the CH identifier.
Step 5: If cluster Head select its member above 30% of energy capacity nodes, remaining nodes are removing from the cluster head.
Step 6: The position of the nodes and their speed must be updated periodically.
Step 7: Select the gateway node with high potential score from the above 30% of energy capacity nodes.
Step 8: Accept the path.
Step 9: Otherwise path will be rejected.
Step 10: Stop.

In the above algorithm is executed based on the high potential score nodes (above 30% of energy capacity nodes) in each and every Cluster Head (CH) transmission range to find the path from source to destination for hop1, hop2 and so on until reach the destination. If any cluster member node does not have sufficient power (below 30% of energy capacity nodes) the path will be rejected. This algorithm is high link stability routing algorithm for single cluster head selection. If the cluster head is threshold, choose another cluster head based on the second high potential score node and act as a cluster head, the same procedure will execute until reach the destination and during the transmission.

Node Weight Calculation: Each node calculates its weight compare with other neighbour node weight. Which node have above 30% of potential score and also have forward node capacity, that node declare the cluster head (CH) to all other neighbour nodes within the transmission range. Mathematically node weight is calculating the following equation.

$$N_W \leftarrow N_M + N_B + N_E + N_L$$

Where,

N_W is a node weight, N_M is a node Mobility, N_B is a node bandwidth, N_E node energy and N_L is node link stability.

IV. RESULTS & DISCUSSION

Simulation Configurations:

To facilitate the comparison of the simulation results with other research works, the default scenario setting in NS2 has been adopted. The maximum hops allowed in this configuration setting are four. Both the

physical layer and the 802.11 MAC layer are included in the non-wired extension of NS2, where the total bits transmitted is calculated using application layer data packets only and total energy.

Table 1 Simulation parameters

Parameters	Values
Simulation area	1,000 m * 1,000 m
Number of nodes	60
Average speed of nodes	0–25 meter/second
Mobility model	Random waypoint
Number of packet senders	40
Transmission range	250 m
Constant bit rate	2 (packets/second)
Packet size	512 bytes
Node beacon interval	0.5 (seconds)
MAC protocol	802.11 DCF
Initial energy/node	100 joules
Antenna model	Omni directional
Simulation time	500 sec

In this section performance analysis of proposed NWBCF protocol and existing CGSR protocol for MANET through simulation NS2. The following performance metrics to evaluate through simulation:

Packet Delivery Ratio (PDR): The ratio of the packets that successfully reach destination.

$$PDR = \frac{TotalNoofPacketsDelivered}{TotalNoofPacketsTransferred} X\ 100$$

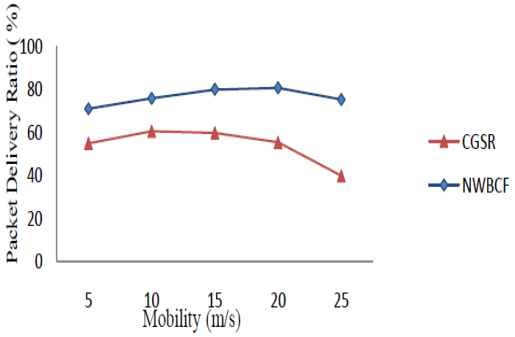

Figure 2. Packet Delivery Ratio (PDR) vs. Mobility

In Fig 2 shows performance comparison of proposed NWBCF protocol and existing CGSR protocol for MANET. Finally proposed NWBCF protocol improved the packet delivery ratio compare to existing CGSR protocol with mobility is increased. So the proposed NWBCF protocol proved better performance compare to existing CGSR protocol.

End-to-End Delay: The end-to-end delivery is number of packet success fully delivered, at the same time delay is reduced.

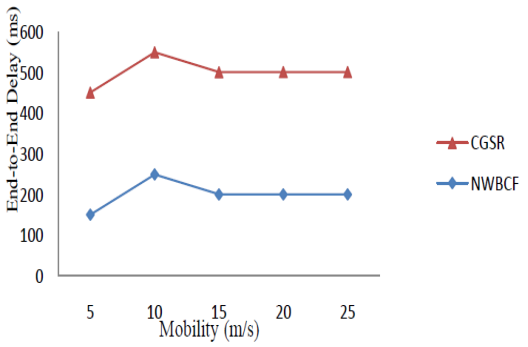

Figure 3. End-to-End Delay vs. Mobility (m/s)

In Fig 3 shows performance comparison of proposed NWBCF protocol and existing CGSR protocol for MANET. Finally proposed NWBCF protocol reduced the end-to-end delay compare to existing CGSR protocol with mobility is increased. So the proposed NWBCF protocol proved better performance compare to existing CGSR protocol.

Routing Overhead: The number of generated and forwarded routing messages as separate metric to understand the routing overhead.

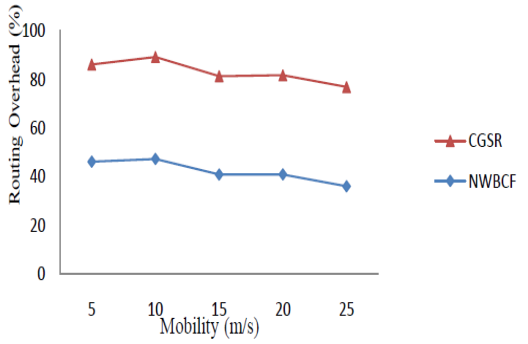

Figure 4. Routing Overhead vs. Mobility.

In Fig 4 shows performance comparison of proposed NWBCF protocol and existing CGSR protocol for MANET. Finally proposed NWBCF protocol reduced the routing overhead compare to existing CGSR protocol with mobility is increased.

V. CONCLUSION

In the recent years many researchers turn to his research in cluster in Mobile Adhoc Networks (MANETs), cause it performance is better compare to ordinary networks. In clustering algorithm it is proposed the idea of assigning a unique identity address to each node in the network and then broadcasting to all the neighbour nodes. Cluster a construct framework for dynamically organizing mobile nodes in

wireless adhoc networks into clusters where it is necessary to provide robustness in the face of topological changes caused by node motion, node failure and node insertion/removal.In this paper proposed a new routing algorithm named Node Weight Based Cluster Formation (NWBCF). This proposed algorithm will execute based on the high potential score (Cluster Head) node and every cluster member node select above 30% of energy capacity nodes. The remaining nodes are removed from the cluster head region for find the path from source to destination to hop1, hop2 and so on until reach the destination. If the cluster head is will go for threshold, choose another above 30% potential score node act as a cluster head until reach the destination. Performance analysis of proposed algorithm NWBCF protocol and existing CGSR protocol. Finally the proposed NWBCF protocol provides batter performance (Packet Delivery Ratio (PDR), End-to-End Delay, and Routing Overhead) compare to existing CGSR with mobility is increased.

REFERENCES

[1]. Abbasi, A.A., Younis, M., "A survey on clustering algorithms for wireless sensor networks", Computer Communication, Vol: 30, Iss: 14, PP: 2826–2841, 2007.

[2]. Ahmad, N., Hussain, S.Z., "Broadcast expenses controlling techniques in mobile ad-hoc networks: a survey", J. King Saud Univ. Comput. Inf. Sci, 2015.

[3]. Aitha, N., Srinadas, R., "A strategy to reduce the control packetload of AODV using weighted rough set model for MANET", Int. Arab J. Inf. Technol, Vol: 8, Iss: 1, PP: 108–117, 2009.

[4]. Al-Rodhaan, M.A., Mackenzie, L., Ould-Khaoua, M., "Improvementto blocking expanding ring search for MANETS", Dept of Computing Science, University of Glasgow, Glasgow, UK, Vol: 286, No: 1, PP: 1–13, 2008.

[5]. Gargano, L., Hammar, M., "Limiting flooding expenses in on-demand source initiated protocols for mobile wireless networks", Proc. Of IEEE-ICP&DPPS, pp. 220–228, 2004.

[6]. Hussain, S.Z., Ahmad, N., "Cluster based controlling of routeexploring packets in ad-hoc networks", Advanced Computing, Networking and Informatics, Vol. 2. PP. 103–112, 2014.

[7]. Karenos, K., Kalogeraki, V., Krishnamurthy, S.V., "Cluster based Congestion Control for Supporting Multiple Classes of Traffic in Sensor Networks" (Ph.D. thesis). University of California, 2005.

[8]. Senthil, Velmurugan, Mangai, "A new approach to geographic routing for location aided cluster based MANETs", EURASIP Journal on Wireless Communications and Networking 2011.

[9]. Abhishek Majumder, "DEMAC: A Cluster-Based Topology Control for Ad Hoc Networks", IJCSI International Journal of Computer Science Issues, Vol: 7, Iss: 5, September 2010.

[10]. Suchismita Chinara, Santanu Kumar Rath. "A Survey on One-Hop Clustering Algorithms in Mobile Ad Hoc Networks", Journal of Network System Management, Vol: 17, PP: 183 207, 2009.

[11]. Xi'an Jiaotong, et al. "WACHM: Weight based adaptive clustering for large scale heterogeneous MANET", Communications and Information Technologies; ISCIT '07; 2007.

[12]. Hui Cheng, et al. "Stability-aware multi-metric clustering in mobile ad hoc networks with group mobility", Wireless Communications and Mobile Computing, Vol: 9, PP: 759-771, 2008.

[13]. R.P. Yadav, "Clusterhead Selection in Clustering" Troy, NY 12180 U.S., 2008.

[14]. Haiyan and Haiying, "A Modified Cluster Head", Proc. of ICNSC 2008, PP: 6-8.

[15]. J. Y. Yu, P. H. Joo Chong, "An efficient clustering scheme for large and dense mobile ad hoc networks (MANETs)", Computer Comm., Vol: 30, PP. 5-16, 2006.