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An Enhanced Cluster Head Election Weighted Clustering Algorithm in MANET

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Abstract - ***Mobile ad hoc network is a form of wireless network. On this community the entire nodes are equipped to move freely in any path independently. The connectivity between nodes is furnished utilizing wireless links. On this context nodes are linked with each different's radio frequency. If nodes are particularly cellular then conversation in such sort of network is an elaborate venture. Consequently, in order to expand the community scalability and efficiency network clustering procedures are implemented with the network. Consequently, on this proposed learn the clustered routing protocols are investigated. In between distinct type of routing protocols a most promising clustering algorithm, specifically weighted cluster routing protocol is observed inside of. That presents a giant improvement on community performance, consequently a new algorithm is offered for bettering more the cluster formation and performance of the community. On this proposed WCA routing process memory (buffer, size), connectivity (quantity of neighbors), mobility (displacement in line with time), last energy (battery vigor) and recent route information (lowest sequence quantity) parameters are considered for cluster formation.***

Keywords—MANET; WCA; AODV

1. INTRODUCTION

A wireless ad hoc network is a kind of decentralized network. Due to their makeshift nature there is not a pre-existing infrastructure available. In lieu of that, every node can perform routing by forwarding data to others, which nodes forward data is discovered dynamically by using network connectivity. An ad hoc network basically defined by a set of network devices with similar functions. These devices are free to associate with any other device in a scope. This network is defined under IEEE 802.11 wireless standards. Connectivity between nodes is affected by the node's resources and behavioral properties as well as connection properties. A functioning network must be able to manage with this dynamic configuration. The network offers communication between any two nodes via relaying the information through intermediate nodes. A network path is a list of connected nodes that link two nodes source and destination. Different routing techniques use more than on paths between source and destination. Using constant flooding data is delivered using available paths [1]

In most wireless ad hoc networks, nodes making efforts to get access for sharing wireless medium, that can resulting in collisions issues in network. Using cooperative wireless communications network improves their immunity for collision by including the destination node associate self and other-node snooping to improve decoding of required information. To access the Internet, anode can connected via wire or wireless connection with ISP server.

MANET nodes are furnished with wireless transmitters and receivers utilizing antennas, which could also be tremendously directional (point-to-factor), omni directional (broadcast), most likely steer ready, or some mixture there of. At a given factor in time, relying on positions of nodes, their transmitter and receiver insurance plan patterns, communication vigour stages and co-channel interference phases, a wi-fi connectivity in the form of a random, multihop graph or "ad hoc" community exists among the nodes. This ad hoc topology may adjust with time because the nodes move

or regulate their transmission and reception parameters.

The characteristics of these networks are summarized as follows:

- Transmission via wireless means
- Nodes can perform the roles of both hosts and routers
- Bandwidth-constrained, variable capacity links
- Energy-constrained Operation
- Restricted Physical Security
- Dynamic network topology
- Frequent routing updates

With clustering delivering some gigantic advantages, a brand new challenge arises once we try to come up with easy but knowledgeable algorithms to divide nodes into clusters. There are numerous means of undertaking this, but the unique motives to remember may also be overwhelming. Balance, load balancing, mobility, maximum cluster dimension, minimal quantity of clusters, variants in clusters, maximum number of hops to the cluster head, power manage, bandwidth utilization and lots of more elements desires to be optimized. Thus within the pool of clustering algorithms, each and every considers a number of of those features. All these algorithms focus on exclusive problems and so they're acceptable to unique environments and used for distinct functions. The proposed work is encouraged with the aid of a piece of writing offered by using Naveen Chauhan et al (2011) [2], In Cluster headquartered routing, various clusters of cell nodes are shaped. Cluster-head in each and every cluster is obligated for routing among clusters. On this paper creator asserts and implements dispensed weighted clustering algorithm for MANETs. This approach is established on combined weight metric which considers method parameters like node degree, transmission range, power and mobility of the nodes. The performance of the proposed scheme was evaluated through simulations in various network occasions. Simulation results confirms that increased allotted weighted clustering algorithm (DWCAIMP) outperforms the disbursed weighted clustering algorithm (DWCA).

Additionally, author proposes additional work to increase performance by way of given that further/new parameters for nodal weight computation. In provided algorithm, cluster head decision is restrained to single hop neighbours. This protocol can be outspreaded to include multi-hop or ok-hop neighbours. This Protocol is proven on simulation environment and can extra be carried out real world eventualities.

1.1 literature survey

Naveen Chauhan et al [2], Wireless network don't require a base station for offering network connectivity. Differentiation of MANET characteristics that distinguishes MANETs from different wire-less networks makes routing a challenging mission. Cluster founded routing is a routing schemes in MANET where quite a lot of clusters are formed having its possess cluster-head which is accountable for routing among clusters. On this paper, advise and put in force a distributed weighted clustering algorithm for MANETs. This avenue is founded on combined weight metric that takes into communication several system parameters just like the node measure, transmission range, energy and mobility of the nodes. Performance of the proposed scheme is evaluated via simulation in various community set-ups. Simulation outcome advise that expanded distributed weighted clustering algorithm (DWCAIMP) outperforms the original distributed weighted clustering algorithm (DWCA) [2].

Noman Mohammed et al [3], leader Election within the presence of selfish nodes for intrusion detection in mobile ad hoc networks (MANETs). Nodes with most remaining resources will be elected because the leaders to steadiness the useful resource consumption among all nodes and extend MANET lifetime, however, there are two foremost difficulties in attaining this purpose. First, a node may just show off selfish behaviour with the aid of lying about its closing resources and accordingly, break out election. 2d, electing an choicest crew of leaders to diminish overall

resource consumption may experience prohibitive efficiency overhead in case, when such election requires flooding of community. To deal with selfish nodes obstacle, author grants a solution based on mechanism design idea. Specifically, resolution offers incentives, comparable to elevated fame, to inspire honest participation in election approach. The measure of incentives will depend on the Vickrey, Clarke, and Groves (VCG) mannequin to make certain truth-telling is the dominant procedure for any node. To handle the surest election limitation, author recommend a series of low-priced nearby election algorithms that may results in world most desirable election. Writer addresses these issues in two utility settings, particularly, Cluster stylish leader Election (CDLE) and Cluster independent chief Election (CILE). The CDLE requires Pre-clustering of nodes, at the same time CILE does not require any pre-clustering. Ultimately, creator justifies the effectiveness of the proposed schemes via vast experiments.

Ditipriya Sinha et al [4], devised a novel algorithm CLAR that builds an agent centered routing protocol making use of ACO process in cluster headquartered MANETs. Clustering makes hierarchical routing feasible the place paths are recorded between cluster-heads as an alternative of nodes, this reduces routing overheads. Presence of an unstable and non-trustworthy cluster-head decreases the community performance, given that cluster-heads of the network route messages between a supply vacation spot pair. Proposed algorithm identifies essentially the most riskless and steady node as a cluster-head, on four standards that is - balance, battery energy, degree, and trust price of the node. It also makes use of a multi-agent situated routing algorithm to generate balanced routes between source and vacation spot in cluster-founded community. Performance of CLAR is when compared with different efficient algorithms reminiscent of AODV, CBRP, Wu & Li's Algorithm; dominating set established clustering algorithms, agent-based algorithms often called SACO and MALBACO. Simulation results concludes that the proposed protocol presents effective packet delivery even within the presence of excessive load within the network with the aid of combining benefits of clustering process and agent based strategy.

Javad AkbariTorkestani et al [5], implemented clustering algorithm, urged that relative mobility of every host with appreciate to all its neighbours is estimated via sampling its mobility parameters in various epochs. MCFA is a thoroughly dispensed algorithm the place mobile independently identifies the neighbouring host with least expected relative mobility as its cluster-head. That is achieved headquartered completely on nearby knowledge each and every host receives from its neighbours and the hosts is also un-synchronized. The data-situated/observational outcome exhibit the superiority of MCFA over the exceptional present mobility-headquartered clustering algorithms in phrases of the quantity of clusters, cluster lifetime, re-affiliation cost, and manipulate message overhead.

Thomas Watteyne et al [6] Surveys this epitome shift for routing in WSNs and, in contrast to previous juncture surveys, follows a alternatively annals organization inside the given protocol taxonomy. For each protocol household, we provide informative presentation of the elemental inspiration, a discussion on the improvement and divergence on that suggestion, and a specified description of the latest system of the protocols of that family. This group provides a thought of design choices in rising IETF ROLL protocols and supplies design argument of curiosity to the WSN engineer, well-nigh allow the design and effectuation of more riskless and effective WSN solutions.

1.2 Problem Statement

The main aim of the proposed clustered routing algorithm is to enhance extra stable and efficient cluster head resolution algorithm development wherein the efficiency of network is drastically increases thus the following issues are viewed for the ideal cluster head selection method. Cluster head must have the ample energy, Cluster head need to update routing information Cluster head can be in contact with maximum possible nodes Cluster head having fewer hundreds in the end required to stable cluster formation.

2. Proposed Work

The proposed routing algorithm is described in two different section first the primary calculation and secondly the cluster head selection.

Proposed Algorithm

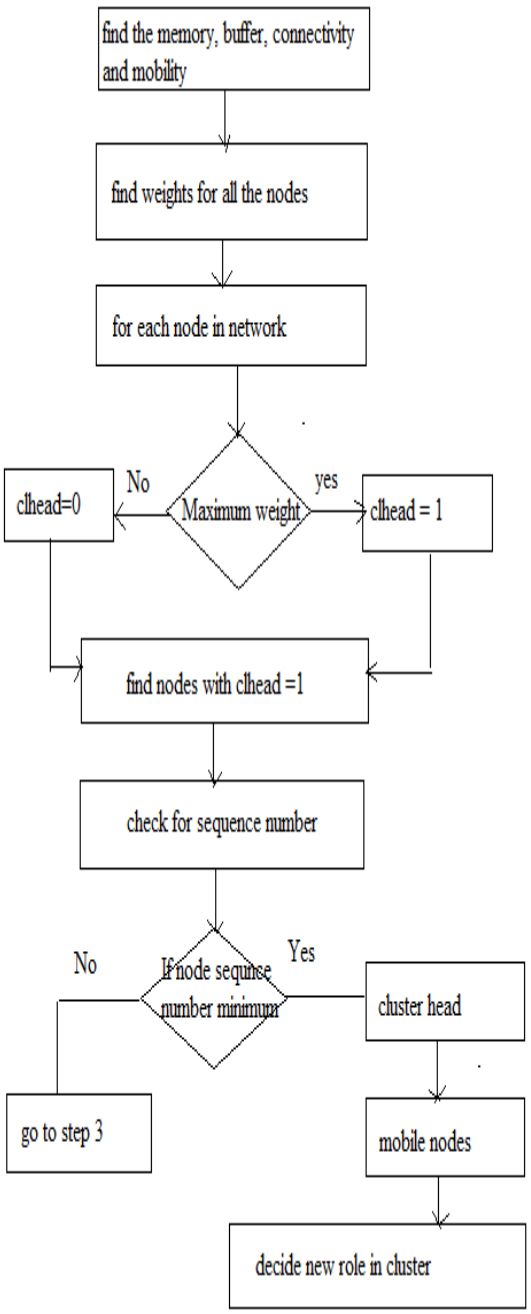

Fig.1 Proposed Routing Algorithm

Simulation & Results

The simulation is carried out in NS-2 with number of nodes 43, XY dimension 750X550 and routing protocol is AODV

End-to-End Throughput

Ratio of victorious message supply over a communication channel is known as throughput. Unit of throughput i= bits/time or bits/timeslot. The total approach throughput η; is defined because the quantity of bits that may be transmitted in all iconnections per second. For any connection, its end-to-end throughput is the same because the bits successfully transmitted by the node which is the prior hop of the destination. In our network state of affairs, where each node has the same time fraction for knowledge transmission, η may also be calculated by $\eta = \sum_{j=1}^{i} tjcj$

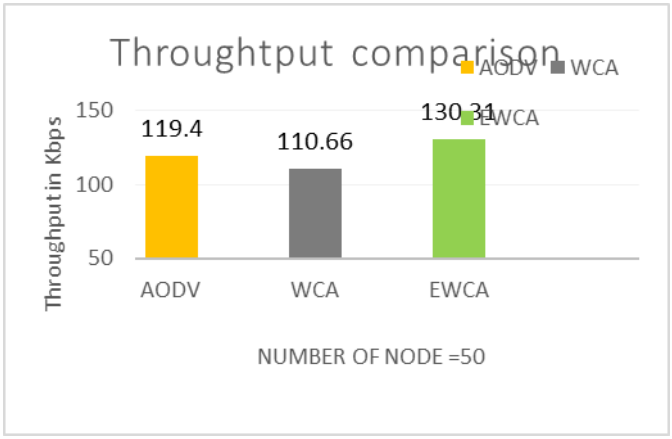

Fig.2. Throughput Comparison

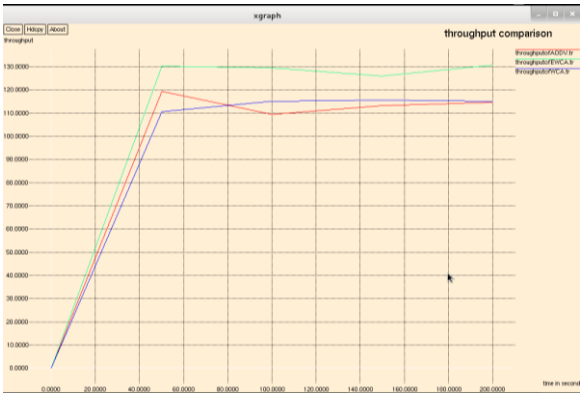

Fig.3 Throughput comparison

End-to-End delay

It's the time taken via a packet to travel from supply to vacation spot in MANET. It's blend of delays within the entire procedure of switch from source to vacation spot. Packet end-to-end prolongs in case of WCA and EWCA relies on the protocol routing approach and number of nodes involved.

In the given diagrams the X axis demonstrates the quantity of nodes and the respective extend in ms is indicated in Y axis. Additionally the orange bar demonstrates the end-to-finish extend beneath traditional AODV conditions, aqua bar display the top-to-end prolong of WCA and the green bar indicates the end-to-end delay of the proposed EWCA routing procedure.

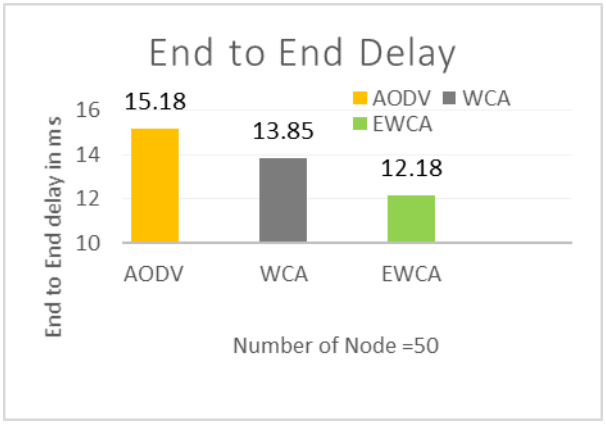

Fig.4. End to End Delay Comparison

Fig.5. End to end delay comparison

Clustering Overhead

The clustering overhead indicates the amount of additional algorithm and reelection of CH because of unsuccessful transmission in network. Within the given diagrams the X axis demonstrates the quantity of node and the respective routing overhead is indicated in Y axis. Moreover the orange bar demonstrates the routing overhead beneath ordinary AODV, aqua bar demonstrate the overhead of present algorithm WCA and the green bar shows the routing overhead of the proposed EWCA. Consistent with the evaluated outcome the routing overhead of the proposed technique is far adaptable as a result of much less routing overhead.

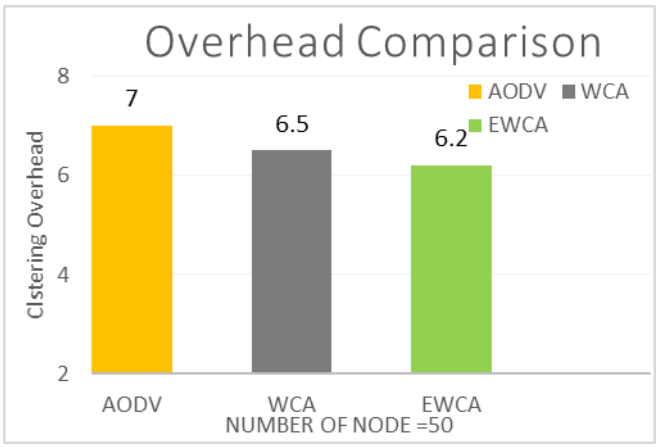

Fig.6. Clustering Overhead

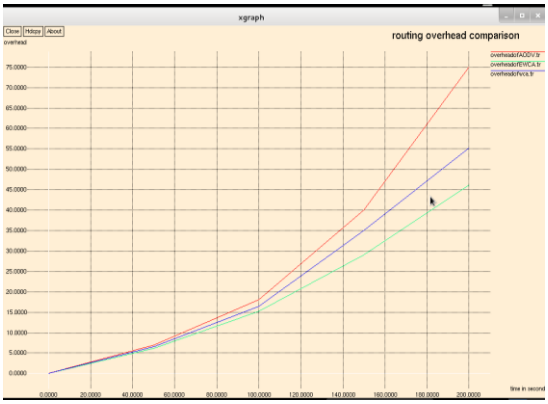

Fig.7. Comparison of overhead

3. CONCLUSIONS

In this presented study mobile ad hoc networks and their challenges to find the more stable and efficient network clustering algorithms are explored and investigated. For that purpose various recently developed weighted clustering and optimum clustering schemes are learned. After investigation weighted clustering algorithm is modified with additional network parameters. Traditionally the weighted clustering algorithm is developed using the remaining energy, mobility, connectivity and available memory. This technique is further explored and enhanced using introducing the additional parameter in the WCA algorithm. In order to enhance the given technique lowest sequence number is added with the traditional WCA algorithm. The implementation of the proposed routing technique is given using TCL script development and simulation is performed over the NS2 (network simulator 2). After successfully implementation of the traditional and proposed WCA algorithm the performance of both routing technique is compared using different performance parameters. In future, the proposed WCA (weighted clustering algorithm) is optimal due to less end to end routing delay and high throughput and packet delivery ratio. That is obtained due to the fresh route selection using lowest sequence number selection during cluster head election. In near future the proposed routing algorithm is enhanced more with additional routing parameter section for optimizing more stable cluster formation.

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