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A Novel Swarm Intelligent Based Optimization Local Broadcast Algorithm for Dynamic Approach in Wireless Ad Hoc Networks

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ABSTRACT : In wireless adhoc networks usage are increased in now a days to broadcast their information from one node to another nodes in the networks, it can be categorized into two types static and dynamic. In static approach, information of each and every node is updated automatically forward nodes information from one after another to identify best broadcasting schema results based on local topology and an internationally identified precedence purpose. Due to level of transmission range increases within the communication range and larger level of density methods required to perform local and global broadcasting methods in WAN (Wireless Adhoc Networks). In this paper, mainly focus on dynamic broadcasting approach by determining the level of each and every nodes in WAN based on flying behavior of fireflies where each and every firefly moves from one stage to another stage to identify the level of nodes to broadcast their information in well efficient manner ,since firefly is one of the most important algorithm to enhance their broadcasting level is considered as best results rather than earlier broadcasting methods in dynamic manner based on local topology information and broadcast state information. After their determination of best nodes in the network through FA, then need to broadcast their information to all nodes in the network in well organized manner. Experimentation results shows that proposed dynamic firefly optimization local broadcasting schema achieves full optimal broadcasting results, and a continuous estimate to the most favorable resolution.

Key Words: Broadcasting, distributed algorithms, Firefly Optimization (FA), Local Broadcasting Algorithm, Static and dynamic approach, Wireless adhoc Network.

1. INTRODUCTION

Wireless networks are being more and more used in the message in the middle of procedure of the majority wide-ranging type and dimension. Personal devices of users, hand held devices and sensors nodes are being used in more than a few surroundings, such as habitation, construction, municipality, tree-plant, and field. Dissimilar wireless network principles and knowledge include become visible in the most recent years to allow straightforward operation of function.

In wireless adhoc network nodes in the network can communicate with each other through the routing and one to one, one too many and many to one transmission wireless links. Since there is no centralized devices applicable to control their devices in wireless adhoc network, each and every node in the network access as individual as a router, it automatically forwarding message from one node to another nodes in wireless adhoc network. The major issues occurs in this work is development of efficient methods that have efficiently broadcasting their data to another nodes in the network with less communication overhead in largest wireless adhoc network and smaller wireless adhoc network also .

One of the major operation carried out by wireless adhoc networking is broadcasting ,where each and every nodes in the network broadcasting their information to everyone of the nodes in the networks .Some of the attacks also occurred in these schemas are flooding ,Sybil and Dos Attack etc,..One of the important attack is flooding attacks since every transmission in network handles larger time to transmit message from one to another node in the network (WAN). Though, flooding can inflict a huge numeral of unnecessary communication, which cans consequence in considerable throw away of controlled property such as bandwidth and power.

In recent years several number of topologies work have been carried out to overcome the problem of broadcasting such as network topology is known [1], [2]. The major desire and

necessary objective of the work is need to satisfy the efficient broadcast communication among numeral of nodes in the networks with less communication overhead and without loss of their data possibly within the range of specified factor in the WAN .If the local and global methods reaches both of these constraints as mentioned above ,becomes very difficult to maintain nodes in the network [3],these local and global broadcasting methods can be classified into two ways statically (contains local information) or dynamically (contains entire nodes information) [4].

It have been extensively used in number of applications in WAN such as route discovery process ,message transferring mechanism along with several number of routing mechanism [5], while sending a unwanted message to route nodes it eliminates the unauthorized nodes in the entire wireless adhoc networks . In earlier work fully connected schema [6] also proposed along with dominated and undominated set broadcast algorithm with the intention of uses simply interior nodes to promote the transmit small package. If both nodes in the network are expanded from marking procedure [7]. Those nodes in the network which is not part of wireless adhoc network for current communication process send a message to nearest nodes in the network .Consequently, the amount of unnecessary communication is concentrated.

In this work we only focus on dynamic schema to support broadcasting communication in well organized manner at any time in the wireless adhoc network, if any nodes in the network occurs at an any time, it automatically starts broadcasting process. Using these methods the consolidated schema may be different beginning individual broadcast instance in the direction of a different still at what time the entire network topology and the source node stay behind unaffected. Accordingly, the broadcast algorithms perform broadcasting process without lesser communication cost and lesser number of failures in every process in anywhere in the network. Efficiently identification of nodes in the network becomes major problem, to efficiently finds path in the network we use a firefly optimization framework, it also perform local broadcasting schema in well efficient manner, it was initially developed by author Xin-She Yang [8-9]. Based on the light intensity and attractiveness only each fireflies very easily produce best optimal path results in the network to broadcasting their data to all nodes in the network [10].

2. BACKGROUND STUDY

In recent years several number of local and global broadcasting methods have been performed to broadcasting methods from that one of the methods are probability and counter based techniques [11-12], it is something differ from normal methods ,it methods may not relying on neighborhood information. These algorithms may not fully eliminate overhead communication among one after another nodes in the wireless adhoc network or substitute neighbor information. These local information broadcasting methods is again classified into neighbor-designating [13-15] and self-pruning algorithms. In nearest neighbor methods each and every node in the network chooses local information nodes to send and broadcasting their data to other nodes based on forwarding their message to nearest nodes in the WAN and these selected nodes only consider for next forwarding process also.

The self pruning method for local broadcasting schema was proposed by peng and lu [16]. It is similar to nearest neighbor broadcasting methods, it doesn't perform retransmission of broadcasting process id any nodes failures in the network, since automatically random nodes are generated to every nodes in the network if any nodes failure in the network while measuring the time among in receipt of the packet for the most important point in time and making a rebroadcast conclusion.

It have been show that fully delivery of packet transmission from every nodes in the networks with one to one hop transmission and do not associated information addicted to the transmit package. For illustration, a promote node u might choose a separation of neighbor nodes in the networks and second neighbor nodes in the network also selected for multiple transmission range communication along with broadcasting process[13]. The decision of the nodes can be made based on self-pruning condition[17]. It follows a difficult process, and its pathway and principles of together aim variables and the task are repeatable. To overcome the problem of local broadcasting schemas and well efficient broadcasting process with lesser delay result in this work we uses a heuristic and meta heuristic based algorithms [19-20] to solve problems in real word networks problems.

3. FIREFLY OPTIMIZATION BASED LOCAL BROADCAST ALGORITHM FOR DYNAMIC APPROACH

Most of the existing methods uses a wireless adhoc networks based on local broadcasting methods without

burden of user their send information or message from one to one another nodes ,these methods can be categorized into dynamic and static broadcasting methods ,both of them differs simultaneously static broadcasting methods perform throughout the sending message to all nodes if receives any information then send message to received nodes and dynamic broadcasting methods perform broadcasting based on local topology networks and nodes information. Dynamic broadcasting methods depend on their information from each and every node that corresponds to position of nodes in the network or topology networks throughout the broadcast development.

From this approach, the development of factor that corresponds to steady state nodes in the network, it vary from one nodes to another nodes with their specific user id and message also differs from one after another in topology ,source nodes in the network kept as same . So communication overhead cost of nodes in the networks based on the self-motivated methods characteristically enclose little protection cost and are predictable to be vigorous in opposition to node breakdown ,nodes in the network removed therefore topology also changed.

Automatically performing local broadcasting prune the irrelevant nodes in the wireless mobile adhoc nodes, it also intelligent to certification together complete freedom and a constant estimation of optimal identification of best broadcasting nodes [18]. However, it uses specific location information to find best broadcasting nodes to broadcast their information to other nodes with pruning parameter results. Based on the location identification for nodes in the networks automatically decreases the communication cost of nodes along with entire estimation of broadcasting communication result in topology networks. But the major problem occurs of these dynamic broadcasting methods is that not produce better broadcasting communication with less communication cost in various applications, in order to overcomes those above mentioned problems we proposed a optimization framework which estimates nodes in the wireless adhoc networks .It fully satisfies along with full delivery of message to all nodes from source to destination path and best estimation of less communication overhead results to all nodes.

In all the above static algorithm and dynamic algorithm not work well in the broadcasting transmission to overcome the problem of local broadcasting schema use a local neighbor schemas that forward message to neighbor nodes, to efficiently broadcast schema .This is named as self –pruning each and every methods chooses the neighborhood data itself, it avoids forwarding/rebroadcasting a message if every one of its neighbors have accepted the message through earlier communication.

Let consider an example to perform local broadcasting schema consider a set of vertices (SV) and edges in the wireless $u \in SV$ has a unique $id(u)$, denoted $id(u)$, and all packet is embossed through the id, of its source node and a nonce, a indiscriminately make number through the source node. If all the edges in the nodes satisfies if and only if all the vertices and nodes $|usv| \leq R$,where $|usv|$ measure distance between all nodes using firefly optimization methods. The results of communication among nodes are represented as graph $G(V, R)$ within in the specified range of transmission communication where it is either two dimensional and three dimensional data space. In authenticity, conversely, the communication series can be of random personality as the propagation of nodes can be precious through several irregular issues. In conclusion, we presume that the system is associated and static for the duration of the transmit.

In general fireflies algorithm depends on two parameters values to identify best optimization results such as lightness and attractiveness ,but the major problem of this methods is that it doesn't change time intervals and fixed number of variables .It doesn't store values of best in memory once solution founds it eliminates in memory .In order to overcome the problem of normal firefly algorithm in this work proposed to use a Gaussian firefly algorithm in order to estimate nodes and evaluates more transmission range within less time of the interval from each and every fireflies moves one place to another place of node to another place of nodes in the network .

It makes some improvement in general procedure of firefly algorithm, step length of the variable is introduces to adaptively change values of the firefly from node to another node during transmission to identify best transmission range .The another one of the firefly is change their behavior of each and every nodes in the movement through direct interaction among one nodes to another nodes on a distribution function that relates to Gaussian function. So all the nodes in the network moves from one place to another place in the network to estimate best nodes in the network within the specified transmission range and less communication cost in wireless adhoc network . Due to the this process adaptive length the algorithm finds entire process lesser communication overhead result for wireless adhoc networks with their searching capabilities of the firefly

and searches best local transmission with lesser communication overhead cost results .Proposed system the weight value of individual nodes in the wireless adhoc network weight values are depends on total number of iterations and it always become lesser value .

$$W_{iter} = u + \frac{(iter_{max} - iter)^n}{(iter_{max})^n} + (v - u) \quad (1)$$

weight of W_{iter} is the weight value of the current nodes in the wireless adhoc network . Value of W_{iter} is between number of nodes in the graph from one node to another node that is u and v, and reduces by the time. Because $\alpha \in [0,1]$ so $u = 0 \& v = 1$. n could be a coefficient function and $iter_{max}$ is upper level of the iteration to perform the transmission range of nodes in the network and iter is iteration I [21]. In equation (1) n values depends on the one to another and its value determined by:

$$n = 10^{(-dimension)} \quad (2)$$

It says that the value of n is low the iteration value of the weight to each nodes in the network is too low . it makes to improve the results of local and global nodes in the wireless adhoc network .

In proposed algorithm this random number automatic selection of number performs one node to other nodes in the wireless adhoc network firefly I movement is attracted with best brightness (lesser communication cost) in wireless adhoc network for next iteration and they will get more transmission ranges in local broadcasting schema.

Random selection of the walking procedure [22] is also introduced to firefly optimization framework with consecutive selection of random number among one to another in the wireless adhoc network. It is based on the step of length as mentioned above to satisfy best broadcasting results ,it finds efficient transmission range in local nodes and as well as global nodes in the wireless adhoc network agents based on a Gaussian distribution. In proposed firefly based optimization framework for local broadcasting algorithm every iteration process of broadcasting with Gaussian distribution is specified in the equation (3).

$$p = f(u|\mu, \delta) = \frac{1}{\delta\sqrt{2\pi}} e^{\frac{-(u-\mu)^2}{2\delta^2}} \quad (3)$$

Where u is an error between current nodes in the wireless adhoc network and fitness value of nodes (firefly) i.

$$u = f(g_{best}) - f(u_i) \quad (4)$$

μ is mean and δ is standard deviation and it is set to $\mu = 0$ and $\delta = 1$. It will be taken at randomly from this Gaussian distribution and it is related probability value p is introduced by:

$$u_i = u_i + \alpha * (1 - p) * U(u, v) \quad (5)$$

That $U(u,v) \in [0,1]$ .l behavior, if the new random transmission range is found best ,it is selected as best known transmission range in current position of nodes in the wireless adhoc network. This strategy of finding best nodes in the wireless adhoc network and best transmission range with lesser communication cost is estimated to wireless adhoc network.

FIREFLY OPTIMIZATION BASED LOCAL BROADCAST ALGORITHM FOR DYNAMIC APPROACH

1. Define objective function to broadcast nodes $f(u) = (u_1, u_2, \ldots u_d)^T$
2. Initialize a population of number of nodes in the graph as fireflies $u = (u_1, u_2, \ldots u_n)$
3. Define light absorption coefficient γ is transmission range
4. While $(t < MaxGeneration)$
5. For $i = 1{:}n$ (all n fireflies)
6. For $j = 1{:}i$
7. Light intensity is determined by $f(u_i)$
8. If $(I_i > I_j)$
9. Move nodes i towards j in all d dimensions
10. Else
11. Move nodes firefly i towards best solution in that iteration
12. End if
13. Attractiveness varies with distance via transmission range
14. Created a local list $list_n(m)$
15. End for j
16. End for i
17. Rank the nodes and find the current best transmission range with less communication cost
18. Define normal distribution
19. For $k = 1 \ldots n$ all n fireflies
20. Draw a random number from defined distribution And apply Eq. (3).
21. Evaluate new solution(new_cost(k))
22. If((new_cost(k) < $cost(i)$)&&($new\_cost(k)$ <

$last\_cost\_iteration(k)))$

23. Move firefly i towards current best
24. Else
25. Repeat steps 4 to 14 again
26. End if
27. End for k
28. End while
29. Post process results and visualization

4. EXPERIMENTATION RESULTS

One of major research of this work is to proposed a well organized dynamic broadcasting methods to achieve both local broadcasting schema with full delivery of message to all nodes in the wireless adhoc network ,in order to measure the results of experimentation of local broadcasting methods along with firefly optimization framework in this work first need to find the nearest nodes information in the wireless adhoc network and nodes selects a broadcasting nodes information to send and receive packet without loss of information. Using the edge nodes information with hop to hop transmission these methods have been carried out within transmission range of nodes in the network .It then make a decision whether selected nodes performs broadcasting in locally or globally based on the position of nodes in the wireless adhoc network along with one hop received the message. In order to estimate the results of broadcasting schemas in this work we randomly set a region in a square of size $1000 \times 1000m^2$.Then allow broadcasting communication at every time of simulation process , preferred the subsequently forwarding node indiscriminately, and second-hand the well-built exposure situation in algorithm 1 to additional decrease the total amount of communication. The communication assortment and the entirety amount of nodes were preferred beginning a huge period consequently with the intention of the replication envelop extremely sparse and extremely intense networks as well as the networks with huge width.

Table 1: Parameters definition

Parameter	Value `
Simulator	Ns-2
Packet Size	256 bytes
Bandwidth	2 mb /sec
Size of square area	1000* 1000 m^2
Area forwarding schema	1 ms
Transmission range	50-300 m
Number of nodes	25-1000

In the Figure 1 shows the broadcasting ratio results of local broadcasting schema in dynamic schema, it shows that achieves higher broadcasting schema than existing methods.

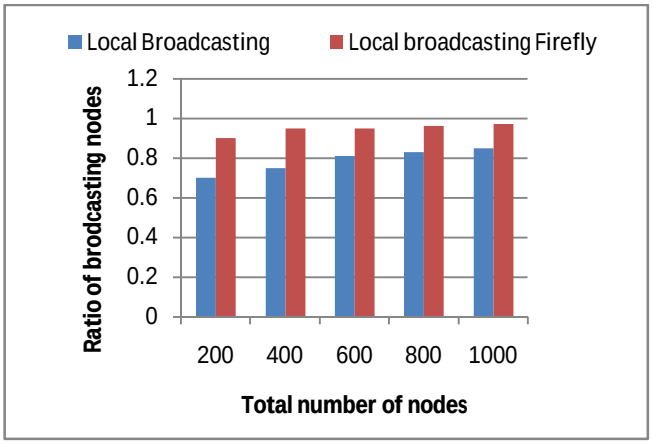

Figure 1: Ratio of broadcasting nodes vs. total number of nodes.

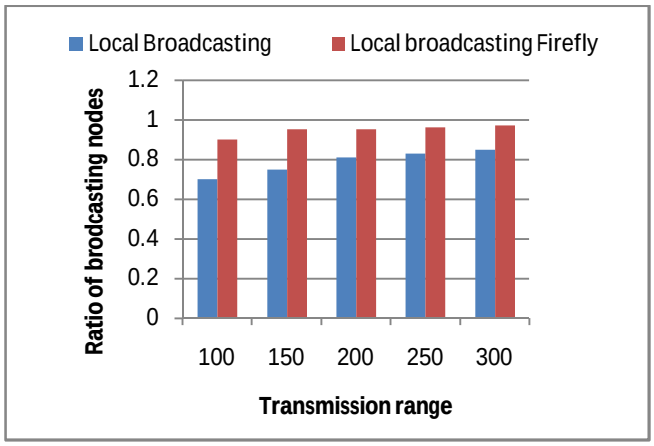

Figure 2: Ratio of broadcasting nodes vs. transmission range

In the Figure 2 shows the broadcasting ratio results of local broadcasting schema in dynamic schema, it shows that achieves higher broadcasting schema, with transmission range than existing methods.

5. CONCLUSION AND FUTURE WORK

In this paper, we measure the results of local broadcasting schema for Firefly optimization framework to share their message among multiple nodes in the wireless adhoc networks to achieve full delivery. As proven, local broadcast algorithms based on firefly optimization framework achieves best transmission range of communication cost over the networks available nodes in the network with reduced communication cost of transmission among nodes in the

network. Local broadcasting approach related to firefly optimization framework, it was lately exposed that a steady estimate is probable by means of (fairly accurate) situation information. It is applied to various number of transmission range it's shown in graph by means of the graph model.

REFERENCES

1. M. Garey and D. Johnson, Computers and Intractability; A Guide to the Theory of NP-Completeness. New York: W. H. Freeman & Co., 1990.
2. J. Wu and F. Dai, "Broadcasting in ad hoc networks based on self pruning," In Proc. IEEE INFOCOM, pp. 2240–2250, 2003.
3. J. Wu and W. Lou, "Forward-node-set-based broadcast in clustered mobile ad hoc networks," Wireless Communications and Mobile Computing, vol. 3, no. 2, pp. 155–173, 2003.
4. J. Wu and F. Dai, "A generic distributed broadcast scheme in ad hoc wireless networks," IEEE Transactions on Computers, vol. 53, no. 10, pp. 1343–1354, 2004.
5. C. Perkins and E. M. Royer. Ad-hoc on-demand distance vector routing. Proc. 2nd IEEE WMCSA, pp. 90–100, Feb. 1999.
6. I. Stojmenovic, S. Seddigh, and J. Zunic. Dominating sets and neighbor elimination based broadcasting algorithms in wireless networks. IEEE Trans. on Parallel and Distributed Systems, 13(1):14–25, Jan. 2002.
7. J.Wu and W. Lou. Forward-node-set-based broadcast in clustered mobile ad hoc networks. TR-CSE-02-15, Florida Atlantic University, June 2002.
8. X. S. Yang, "Firefly algorithms for multimodal optimization", Stochastic Algorithms: Foundations and Appplications (Eds O. Watanabe and T. eugmann), SAGA 2009, LectureNotes in Computer Science, 5792, Springer-Verlag, Berlin, pp. 169-178, 2009.
9. [11] S. L. ukasik and AK. SÃlawomirZ, "Firefly algorithm for Continuous Constrained Optimization Tasks", 1st International Confernce on Computational Collective Intelligence, Semantic Web, Social Networks and Multiagent Systems, Springer-Verlag Berlin, Heidelberg, pp.169-178, 2009.
10. B. G. Babu and M. Kannan, " Lightning bugs", Resonance, Vol. 7, No. 9, pp. 49-55, 2002.
11. Z. Haas, J. Halpern, and L. Li, "Gossip-based ad hoc routing," In Proc. IEEE INFOCOM, pp. 1707–1716, 2002.
12. D. Y. Sasson and A. Schiper, "Probabilistic broadcast for flooding in wireless mobile ad hoc networks," In Proc. IEEE Wireless Communications and Networking Conference, pp. 1124–1130, 2003.
13. H. Liu, P. Wan, X. Jia, X. Liu, and F. Yao, "Efficient flooding scheme based on 1-hop information in mobile ad hoc networks," In Proc. IEEE INFOCOM, 2006.
14. J. Wu, W. Lou, and F. Dai, "Extended multipoint relays to determine connected dominating sets in manets," IEEE Trans. on Computers, vol. 55, no. 3, pp. 334–347, 2006.
15. M. Khabbazian and V. K. Bhargava, "Efficient broadcasting in mobile ad hoc networks," IEEE Transactions on Mobile Computing: accepted for publication, 2008.
16. W. Peng and X.C. Lu. On the reduction of broadcast redundancy in mobile ad hoc networks. Proc. First Annual Workshop on Mobile and Ad Hoc Networking and Computing, MOBIHOC, pp. 129–130, Aug. 2000. Boston, USA.
17. I. Stojmenovic, M. Seddigh, and J. Zunic, "Dominating sets and neighbor elimination-based broadcasting algorithms in wireless networks," IEEE Trans. on Parallel and Distributed Systems, vol. 13, pp. 14–25, 2002.
18. M. Khabbazian and V. K. Bhargava, "Localized broadcasting with guaranteed delivery and bounded transmission redundancy," IEEE Transactions on Computers, vol. 57, no. 8, pp. 1072–1086, 2008.
19. X. S. Yang, "Nature-Inspired Metaheuristic Algorithms", Luniver Press, 2008.
20. X. S. Yang, "Engineering Optimization: An Introduction with Metaheuristic Applications", Wiley & Sons, New Jersey, 2010.
21. D. Yazdani, and M. R. Meybodi, "AFSA-LA: A New Model for Optimization", Proceedings of the 15th Annual CSI Computer Conference (CSICC'10), Feb. 20-22, 2010.
22. X.-S. Yang, "Firefly Algorithm, Lévy Flights and Global Optimization", Research and Development in Intelligent Systems XXVI (Eds M. Bramer, R. Ellis, M. Petridis), Springer, pp. 209-218, 2010.