ISSN XXXX XXXX © 2018 IJESC

Research Article Volume 8 Issue No.5

Enhanced Mobile Ad-hoc Routing Technique based on Reduction in Packet Loss

Achu Anna Antony[1], Bino Thomas[2]
M. Tech Student[1], Assistant Professor[2]
Deparment of Computer Science and Engineering
St. Joseph's College of Engineering and Technology, Palai, India

Abstract:
Mobile Ad-hoc NETwork (MANET) is an anxious self-shaping, framework less system of mobile networks in a remote association. As there is a high climb in the utilization of cell phones and remote systems over past years, MANET has become one of the vital networks used for communication. A routing protocol is utilized for dispersing data that permits choosing routes between two nodes in a system. Packet loss is one of the significant issues that occur in the mobile ad- hoc networks while routing. A packet comprises the unit of information which is steered amongst source and destination in a system. Packet loss happens when at least one packet crosswise over systems in a network drop before achieving the destination node. A node density strategy is proposed in this paper to ease the packet loss issue to a degree. Because of system framework of MANET progressively changes, portable specially appointed system is exceptionally helpless against assaults. Concerning the security reason, we utilize RSA encryption calculation, the keys are sent to all hubs inside a system, the message is encoded and sent to the destination node.

Keywords: MANET, Routing Protocol, Neighbour Node, Node Density Strategy, Packet loss.

I. INTRODUCTION

With late execution A Mobile Ad hoc Network (MANET) consists in a collection of wireless mobile nodes, which form a temporary network without relying on any existing infrastructure or centralized administration. Ad hoc network presents many specific problems which had influence on solution that assure QoS. The level of service that a user obtains from a network is known as the Quality of Service. The goal of QoS offered is to ensure a better delivery of information carried by the network, and a better utilization of the network's resources. The network provides a set of service guarantees such as minimum bandwidth, maximum delay, and maximum packet loss rate while transporting a packet stream from the source to the destination. Usage of mobile nodes these days has increased and the communication enhancement in its network becomes crucial. Ad hoc networks are generally used by military, rescue teams, personal electronic device networking, maritime communications etc. These users cannot rely on the centralized network [10]. The main factors affected in ad-hoc networks are routing and the characteristic of wireless communication. In ad hoc, a node can communicate only with nodes in its area and to communicate with other nodes uses a routing algorithm. [10]. Mobile Ad-hoc network (MANET) is a collection of mobile nodes that constitute a network with no central admin [1]. A MANET can change location and is a kind of ad-hoc network. MANET has its property that it can configure itself. The advantage of a decentralized network is that they are more robust than centralized networks due to its multi-hop pattern. The distributed nature and dynamic topology of Wireless Sensor Networks (WSNs) introduces very special requirements in routing protocols that should be met. The most important feature of a routing protocol, in order to be efficient for WSNs, is the energy consumption and the extension of the network's lifetime. During the recent years, many energy efficient routing protocols have been proposed for WSNs Packet loss in transmission is one of the major limitations in the mobile ad-hoc network. As one node moves away from the network, the connection gets lost and the packet drop may happen and also because of congestion packet loss happens. Congestion happens when many demand requests gathers and when there is a shared medium [11]. To send packets to the Internet, a MANET node acquires information about an Internet Gateway and establishes appropriate routes to this gateway.

II. LITERATURE SURVEY

In the wireless sensor networks with multiple mobile sinks, the movement of sinks or failure of sensor nodes may lead to the breakage of the existing routes. In most routing protocols, the query packets are broadcasted to repair a broken path from source node to sink, which cause significant communication overhead in terms of both energy and delay. In order to repair broken path with lower communication overhead, we propose an efficient routing recovery protocol with endocrine cooperative particle swarm optimization algorithm (ECPSOA) to establish and optimize the alternative path. In the ECPSOA, mutation direction of the particle is determined by multi-swarm evolution equation, and its diversity is enriched by the endocrine mechanism, which can enhance the capacity of global search and improve the speed of convergence and accuracy of the algorithm. By using this method, the alternative path from source nodes to the sink with the optimal QoS parameters can be selected. Simulation results show that our routing protocol significantly improves the robustness and adapts to rapid topological changes with multiple mobile sinks, while efficiently reducing the communication overhead and the energy consumption.[1] AOMDV relies as much as possible on the routing information already available in the underlying AODV protocol, thereby limiting the overhead incurred in discovering multiple paths. In particular, it does not employ

any special control packets. In fact, extra RREPs and RERRs for multipath discovery and maintenance along with a few extra fields in routing control packets (i.e., RREQs, RREPs, and RERRs) constitute the only additional overhead in AOMDV relative to AODV. [1] AOMDV is based on the advertised hopcount [9]. The advertised hopcount of a node i for a destination d represents the maximum hopcount of the multiple paths for d available at i. The protocol only accepts alternate routes with hopcount lower than the advertised hopcount, alternate routes with higher or the same hopcount are discarded. This condition is necessary to guarantee loop-freedom.

1) In AOMDV, advertisedhopcount replaces hopcount in AODV.

2) A routelist replaces nexthop and essentially defines multiple next hops with respective hopcounts.

Mobile Ad hoc Networks (MANET) are remote systems comprising of an accumulation of portable hubs with no settled framework. Because of their decentralized, self-designing and dynamic nature, MANETs offer numerous points of interest and are anything but difficult to introduce. Be that as it may, with this dynamic topology, portable specially appointed systems have a few difficulties like the outline of an effective steering convention. A case for this test is stack adjusting. The multipath steering convention with stack adjusting gives an answer for the blockage system and builds its ability. To consider that the utilization of different ways all the while for transmission information permits to enhance the system execution, we propose another convention LB-AOMDV (Load Balancing-AOMDV), an answer for accomplish better load adjusting component. The reproduction's outcome demonstrates the noteworthy execution change of the system for the multipath directing convention with stack adjusting. The proposed arrangement LB-AOMDV works superior to anything different conventions regarding normal postponement, limit and load adjust. The key problem addressed in our work is the efficient and scalable localization of shared resources. Queries issued by a user are routed to neighbor peers in the overlay network, in order to find resources that satisfy them. Initially the network has a random, unstructured topology(each peer is assigned Ns neighbors randomly chosen), and queries are forwarded as in the scoped flood model. However, we adopt an approach that dynamically selects the neighbors to which a query has to be sent or forwarded. The selection process is performed with the aim to detect peers that with high probability share resources satisfying the query. The selection is driven by an adaptive learning algorithm by which each peer exploits the results of previous interactions with its neighbors to build and refine model (profile) of the other peers, describing their interests and contents. Each peer is characterized by one (or several) general interest and shares resources according to its interest. The characteristics of each peer are summarized in a peer profile. When an agent must forward a query, it compares the query with its known profiles, in order to rank all known peers and select the best suited to return good response. The network topology (i.e., the actual set of peers that are neighbors in the overlay) is then dynamically modified on the basis of the learned contexts and the current information needs, and the query is consequently routed according to the predicted match with other peers' resources. The underlying idea is that an intelligent collaboration between the peers can lead to an emergent clustered topology, in which peers with shared interests and domains, tend to form strongly connected communities of peers. [2] In the conventional mobile ad hoc network (MANET) systems' route rediscovery methods, there exists route failure in all route discovery methods resulting in data loss and communication overheads. Hence, the routing has to be done in accordance with mobility character of the network. In this manuscript, a particle swarm optimization (PSO)-based lifetime prediction algorithm for route recovery in MANET has been proposed. This technique predicts the lifetime of link and node in the available bandwidth based on the parameters like relative mobility of nodes and energy drain rate, etc. Using predictions, the parameters are fuzzified and fuzzy rules have been formed to decide on the node status. This information is made to exchange among all the nodes. Thus, the status of every node is verified before data transmission. Even for a weak node, the performance of a route recovery mechanism is made in such a way that corresponding routes are diverted to the strong nodes. In general, the network depends on the node assistance for providing the packet routing. Routing is the basic operation in ad-hoc networks. The routing algorithm should be robust, adaptive, and in a self-organized way. Nodes cannot forward the data packets to the receiver node when the prediction error is less than a pre-configured threshold value. Prediction is used to make the decision for transmission. A. Vasilakos have presented an application of evolutionary-fuzzy prediction in inter-domain routing of broadband network connections with quality-of-service requirements in the case of an integrated ATM and SDH networking architecture. The node mobility increases the complexity of routing because the greater the mobility of the nodes, the more chances of link breakage. This breakage will in turn lead to increased routing control overhead and will reduce the efficiency of the network due to the increased frequency of the route discovery process. Hence, the action of link breakages in MANET becomes a vital factor. Further, this kind link breakage will also lead to frequent path failures and may cause route reconstructions. As a result, the overhead of the routing protocol will be increased and the lesser packet delivery ratio and longer end-to-end delay will be terminated. Re-routing in a mobile ad-hoc network is costly and would result in flooding the network due to the lack of infrastructure. In addition to that, the re-route discovery is also leading to the large control message overhead and high latency. Therefore, the re-route discovery reduces efficiency of the networks. Routing in MANET is restricted by the network breakage due to their node mobility or energy depletion of the mobile nodes. The existing MANET routing protocols do not operate well in environments prone to frequent and long-lived disruptions. These routing protocols assume usually connected network and require an end-to-end path to exist in order for a source to send data to a destination. Nodes lie near the station are often included in the routing path. Hence, the energy of the node drains quickly. A particle swarm optimization (PSO)-based lifetime prediction algorithm for route recovery in MANET has been proposed. This technique predicts the lifetime of link and node in the available bandwidth based on the parameters like relative mobility of nodes and energy drain rate, etc.. Using predictions, the parameters are fuzzified and fuzzy rules have been formed to decide on the node status. This information is made to exchange among all the nodes. Thus, the status of the every node is verified before data transmission. Even for a weak node, the performance of a route recovery mechanism is made in such a way that corresponding routes are diverted to the strong nodes. With the aid of the simulated results, the minimization of data loss and communication overhead is using PSO prediction. [5]

A. Packet loss reduction method:

In [9] when source node receives Warning Message from any node in the route then it will stop sending packets on that route.

Here extra parameters are needed to be defined rather than finding the route. But in the proposed study, a method to find the route is the only factor needed to be considered. The steps for this method [9] is as follows
1) Transmit packets from source to destination.
2) For every node on the ongoing route do If the energy level is critical, then Node N will generate a Warning Message to the source. Here Node N is any node on the ongoing route.
3) If a Warning Message from any routing host is received, THEN
4) Source will not send a single packet in this current route.
5) It will discard the current route from its cache.
6) If any messages need to be transmitted to the destination then the source will use another route from its cache.
Else
Source will forward packets on the current route.

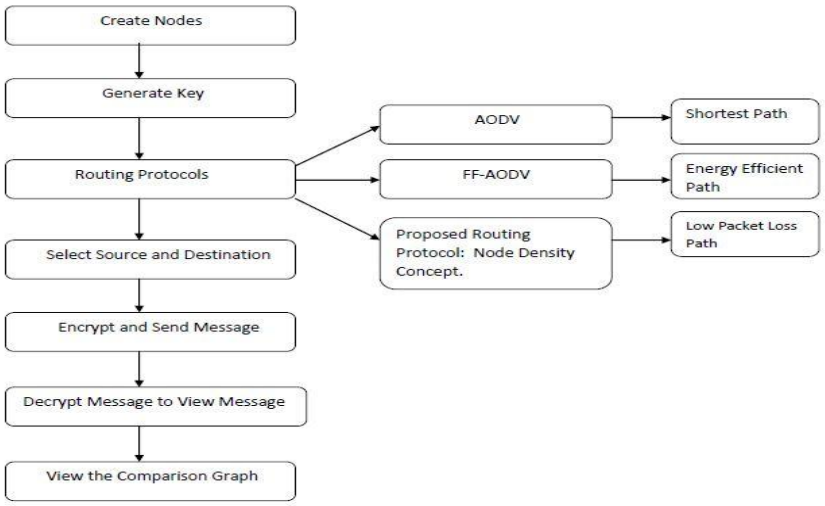
III. SCOPE OF PROPOSED SYSTEM

Packet loss in transmission is one of the major limitations in the mobile ad-hoc network. As one node moves away from the network, the connection gets lost and the packet drop may happen and also because of congestion packet loss happens. Congestion in a network occurs whenever the demands exceed the maximum capacity of a communication link especially when multiple hosts try to access a shared media simultaneously. To send packets to the Internet, a MANET node acquires information about an Internet Gateway and establishes appropriate routes to this gateway. So the proposed concept is based on the packet loss reduction method. Detecting and reacting to packet losses is an important component of any comprehensive security solution. To avoid false positives, before isolating malicious nodes from the path in trust-based security schemes, a thorough investigation and analysis are required to find the actual cause of the packet loss. Without such analysis, the performance of any underlying security solution may degrade, resulting in the punishment of innocent nodes and disconnection of portions of the network, while actual malicious nodes remain undetected. Therefore, current MANET trust-based schemes need to be extended with approaches able to perform a correct diagnosis of packet losses, considering run-time network conditions to detect truly misbehaving nodes. In MANETs, the limited battery capacity of a mobile node affects network survivability since links are disconnected when the battery is exhausted. Therefore, a routing protocol considering the mobile nodes energy is essential to guarantee network connectivity and prolong the network lifetime. Power-aware routing protocols deal with the techniques that reduce the energy consumption of the batteries of the mobile nodes. The routing strategies selection is an important issue for the efficient delivery of the packets to their destination. Moreover, in such networks, the applied routing strategy should ensure the minimum of the energy consumption and hence maximization of the lifetime of the network.

IV. METHODOLOGY

A mobile ad hoc network (MANET) is a wireless network that uses multi-hop peer to- peer routing instead of static network infrastructure to provide network connectivity. MANETs have applications in rapidly deployed and dynamic military and civilian systems. The network topology in a MANET usually changes with time. Therefore, there are new challenges for routing protocols in MANETs since traditional routing protocols may not be suitable for MANETs. For example, some assumptions used by these protocols are not valid in MANETs or some protocols cannot efficiently handle topology changes.

1) Node Module
2) Keys Module
3) Movement Module
4) Data Transmission Module



To start with, make a gathering of hubs that could shape a system. Every hub has given its highlights like the name of the hub, IP address, X point and Y point as a measurement, scope of the hub, neighbors inside the range, energy of the hub. The scope of the hub can be given appropriately. Move and stop the development of hubs if necessary, the speed of development can be changed. development of a solitary hub should be possible. The key is created to every one of the hubs in the system so an assailant hub won't be permitted to take an interest in the message transmission. For this, RSA calculation can be utilized. A user of RSA creates and then publishes a public key based on two large prime numbers, along with an auxiliary value. The prime numbers must be kept secret. Anyone can use the public key to encrypt a message, but with currently published methods, and if the public key is large enough, only someone with knowledge of the prime numbers can decode the message feasibly. Breaking RSA encryption is known as the RSA problem. Whether it is as difficult as the factoring problem remains an open question. RSA is a relatively slow algorithm, and because of this, it is less

commonly used to directly encrypt user data. More often, RSA passes encrypted shared keys for symmetric key cryptography which in turn can perform bulk encryption-decryption operations at much higher speed. Routing protocols AODV is used to find the shortest path. The AODV protocol builds routes between nodes only if they are requested by source nodes. AODV is therefore considered an on-demand algorithm and does not create any extra traffic for communication along links. The routes are maintained as long as they are required by the sources. They also form trees to connect multicast group members. AODV makes use of sequence numbers to ensure route freshness. They are self-starting and loop-free besides scaling to numerous mobile nodes. In AODV, networks are silent until connections are established. Network nodes that need connections broadcast a request for connection. The remaining AODV nodes forward the message and record the node that requested a connection. Thus, they create a series of temporary routes back to the requesting node. A node that receives such messages and holds a route to a desired node sends a backward message through temporary routes to the requesting node. The node that initiated the request uses the route containing the least number of hops through other nodes. The entries that are not used in routing tables are recycled after some time. If a link fails, the routing error is passed back to the transmitting node and the process is repeated. The FF-AOMDV protocol deals with the configuration of route which is having maximum power efficiency. An energy efficient multipath routing protocol called ad-hoc on demand multipath distance vector with the fitness function (FF-AOMDV). The FF-AOMDV uses the fitness function as an optimization method, in this optimization, we seek for two parameters in order to select the optimum route one of them is energy level of the route and the another one is the route distance in order to transfer the data to the destination more efficiently by consuming less energy and prolonging the network lifetime. FF-AOMDV routing protocol, which is a combination of Fitness Function and the AOMDV's protocol. In a normal scenario, when a RREQ is broadcasted by a source node, more than one route to the destination will be found and the data packets will be forwarded through these routes without knowing the routes' quality. By implementing the proposed algorithm on the same scenario, the route selection will be totally different. When a RREQ is broadcast and received, the source node will have three (3) types of information in order to find the shortest and optimized route path with minimized energy consumption.

This information includes:

1. Information about network's each node's energy level
2. The distance of every route
3. The energy consumed in the process of route discovery.

The route, which consumes less energy, could possibly be (a) the route that has the shortest distance; (b) the route with the highest level of energy, or (c) both. The source node will then sends the data packets via the route with highest energy level, after which it will calculate its energy consumption. Alike to other multipath routing protocols, this protocol will also initiates new route discovery process when all routes to the destination are failed. In the event when the selected route fails, the source node will then selects an alternative route from its routing table, which represents the shortest route with minimum energy consumption. A node density method proposed in the project can alleviate the packet loss problem to an extent. Packet loss can occur in ad hoc networks where compromised nodes are not present. This packet loss happens mainly because of the following factors.

A. Congestion in Network

In mobile ad hoc networks, congestion is the main factor for packet loss. As the traffic increases packets may not reach the destination and packet loss happens.

B. Path Change and Noise

In mobile ad-hoc networking, the path condition cannot be made unseen since it changes its path frequently. Presence of noise and fading of the transmitted signals are among the channel conditions that can lead to packet loss or bit errors in the transmitted signal. Because of these factors, packets can get dropped.

C. Energy Constraints

Nodes in mobile ad hoc networks have limited energy resource. As the power of nodes decreases, the low energy nodes can get disconnected which may lead to packet loss.

The mobile ad-hoc network is dynamic in nature the routing protocol will be preferred on the basis of administrative distance value allotted to each path in the network. As an enhancement to AODV protocol, the node density feature can be embedded. When a node is about to get disconnected, the packets must be transferred to the neighbor node which has a maximum number of neighbours. For configuration of routes, select the source and destination. The message to be send is encoded using RSA algorithm for the secure transmission. the security of RSA relies on the computational difficulty of factoring large integers. As computing power increases and more efficient factoring algorithms are discovered, the ability to factor larger and larger numbers also increases. Encryption strength is directly tied to key size, and doubling key length delivers an exponential increase in strength, although it does impair performance. he comparison graph can depicts the improvement in reduction in packet loss for the proposed protocol than AODV and FF-AODV.

NODE DENSITY ALGORITHM

Proposed (Node Density Route Method)

1. Select S and D
2. Create route request
3. Node S broadcast route request to neighbours
4. For each node n, Assign density=0 value

   Density= Density+ n.neighbor.size() */ Size of neighbour is found/*

5. Neighbor nodes with highest node density is chosen as the path to destination from source

Source and Destination within a network is chosen at first. Route request is created and the route request is send from source to neighbor nodes till it reaches the destination, the route request is broadcasted within the network. The route is selected according to the algorithm step, for each node, density is initialized as 0,

Density=Density+ n.neighbor.size().

The total neighbors within the range of nodes is saved in density parameter. Neighbor nodes with highest density is chosen as the path from source to destination.

V. CONCLUSIONS

In this paper, proposed a method on packet loss reduction and node registration methods in AODV for MANET. Mobile ad-hoc network is a self-configuring, dynamic network of the mobile node in a wireless connection. AODV routing protocol is a distance vector routing protocol and uses destination sequence numbers to determine the freshness of routes. RSA algorithm is used to secure the system as a whole. Thus the attacker node will not be able to join the network. For routing, AODV protocol can be used which is already widely used a routing protocol. In order to reduce the packet loss in a network due to disconnectivity of nodes, the node density feature can be considered. In future, more on security and packet loss reduction methods will be concentrated. Multipath routing protocols flood a route request to learn more than one path to the destination to forward packets through them. It is not necessary that the source will always find the optimum or the shortest path available. Since the power source of the mobile nodes is limited, the power consumption by these nodes should be controlled to increase the network lifetime. Multipath routing protocols have several issues. One of them is finding an optimum path from the sources to the destinations. The issue becomes more complicated with a large number of mobile nodes that are connected to each other for transferring the data. Subsequently, the more energy is wasted at data transfer. Mobile ad-hoc network is a self-configuring, dynamic network of the mobile node in a wireless connection. AODV routing protocol is a distance vector routing protocol and uses destination sequence numbers to determine the freshness of routes. The graph depicting the variation of packet loss among three routing protocols is shown in the bellow Graph.

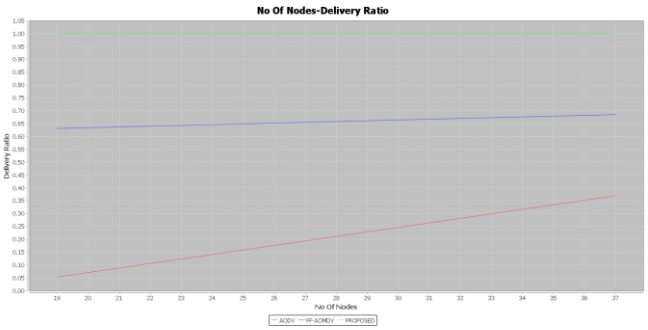


Figure.2. Number of nodes vs Node delivery ratio

VI. REFERENCES

[1] M. K. Marina and S. R. Das, "Ad hoc on-demand multipath distance vector routing," Wireless Commun. Mobile Comput., vol. 6, no. 7, 2006.

[2] M. Tekaya, N. Tabbane, and S. Tabbane, "Multipath routing mechanism with load balancing in ad hoc network," in Proc. Int. Conf. Comput. Eng. Syst. (ICCES), Nov. 2010.

[3] L. Gatani, G. L. Re, and S. Gaglio, "Notice of violation of IEEE publication principles an adaptive routing protocol for ad hoc peer-to-peer networks," in Proc. 6th IEEE Int. Symp.WorldWireless Mobile Multimedia Netw., Jun. 2005.

[4] S. Mueller, R. P. Tsang, and D. Ghosal, "Multipath routing in mobile ad hoc networks: Issues and challenges," in Performance Tools and Applications to Networked Systems. Berlin, Germany: Springer, 2004.

[5] V. Balaji and V. Duraisamy, "Varying overhead ad hoc on demand vector routing in highly mobile ad hoc network," J. Comput. Sci.,2011 .

[6] A. Montazeri, J. Poshtan, and A. Youse-Koma, "The use of 'particlE swarm' to optimize the control system in a PZT laminated plate," Smart Mater. Struct. 2008

[7] Y.-F. Hu, Y.-S. Ding, L.-H. Ren, K.-R. Hao, and H. Han, "An endocrine cooperative particle swarm optimization algorithm for routing recovery problem of wireless sensor networks with multiple mobile sinks," Apr. 2015

[8] O. Smail, B. Cousin, R. Mekki, and Z. Mekkakia, "A multipath energy-conserving routing protocol for wireless ad hoc networks lifetime improvement," EURASIP J. Wireless Commun. Netw.,2014..

[9] D. Manickavelu and R. U. Vaidyanathan, "Particle swarm optimization (PSO)-based node and link lifetime prediction algorithm for route recovery in MANET," EURASIP J. Wireless Commun. Netw., vol. 2014.

[10] D. K. Sharma, A. N. Patra, and C. Kumar, "An update based energy efficient reactive routing protocol for mobile ad hoc networks," Int. J. Comput. Netw. Inf. Secur. (IJCNIS), 2013.

[11] D. A. Rajaram and J. Sugesh,"Power aware routing for MANET using on demand multi path routing protocol," Int. J. Comput. 2011.

[12] B. Sun, C. Gui, and P. Liu, "Energy entropy multipath routing optimization algorithm in MANET based on GA," in Proc. IEEE 5th Int. Conf. Bio-Inspired Comput., Theories Appl. (BIC-TA), Sep. 2010

[13] P. Hiremath and S. M. Joshi, "Energy efficient routing protocol with adaptive fuzzy threshold energy for MANETs," Int. J. Comput. Netw. Wireless Commun., 2012.

[14] F. De Rango, F. Guerriero, and P. Fazio, "Link-stability and energy aware routing protocol in distributed wireless networks," IEEE Trans. Parallel Dis-trib. Syst., Apr. 2012.

[15] P. Hiremath and S. M. Joshi, "Energy efficient routing protocol with adaptive fuzzy threshold energy for MANETs," Int. J. Comput. Netw. Wireless Commun., 2012.

[16] F. De Rango, F. Guerriero, and P. Fazio, "Link-stability and energy aware routing protocol in distributed wireless networks," IEEE Trans. Parallel Dis-
trib. Syst., Apr. 2012.

[17] C.W. Chen and C. C.Weng, "A power efficiency routing and maintenance protocol in wireless multi-hop networks," J. Syst. Softw., 2012.