New Optimized Ant Colony Based Routing For Wireless Sensor Network

[1]Dr. Nasib Singh Gill, [2]Sarla

[1] Professor, Dept of Computer Science & Technology, MDU, Rohtak,
[2]M.Tech Student, Dept of Computer Science & Technology, MDU, Rohtak,

Abstract: WSN is a gathering of portable hubs in any remote system that are interlink with each other through any remote Communication medium and does not requires any fixed foundation. Kind of system is broadly versatile and convenient in nature. Portable hubs that are associated in this sort of system give full usefulness of host and switch in the system. For all interchanges in this kind of systems requires a versatile protocol that can deal with development of portable hubs. For this, Ant state based protocol convention is suited which depends on the taking a shot at Ants, all things considered. Over the current protocol convention this paper speaks to provide communication support to portable hubs. Advancement that has expressed in this paper will help in no of courses; for example, Reduce overhead handling, longer battery life, and Reduce delay in correspondence, more steady system.

Keywords: WSN, Ant Based Routing, Wireless Network Protocol.

I   INTRODUCTION

Remote Sensor Network is accumulations of self-governing hubs that exist in rapidly changing system condition. Fundamental constraint with self-sufficient portable hubs is restricted power source, processing power, low-band width and many more. [1][2][3][4] Figure 1 speaks to essential bi-directional portrayal of the versatile system. Attributes in any Wireless Sensor Networks are describes as underneath:

a)   Randomly Changing Topologies

At the point when a system comprises of hubs that are portable in nature than topology of the system will change randomly and quickly this is because of the idea of hub for which system is organized.

b)   Transmission Capacity of remote connections

In contrasted with wired system structure, bandwidth in remote system structure is low because of restricted transfer speed accessible for transmission. Also with random movement of the mobile host in the network, network topology changes rapidly that affect the transmission capacity in the network.

c)   Power and Energy Efficiency:

Portable hubs works with batter power as no physical wired power source is accessible. Lifetime of any connection in systems will specifically rely on the left out battery energy of all the portable hubs that take part in a specific communication in the system. With this for keeping up organize steadiness we should center on battery energy of versatile hubs in any system.

d)   Network Security

As contrasted and wired system, remote system are more prone to intruders, hubs in remote system quickly change topology and there is no central regulatory framework exist to detect security flaws in such system. Therefor security is up to the individual hubs in the networks.

e)   Scalability:

With remote nature of system no. of hubs can increment quickly in the system. Each of which is free in nature and contains own priority & will impart system communication. All of the hubs in the network will work for the network communication by forwarding data packets to the correspondence hubs in the networks.
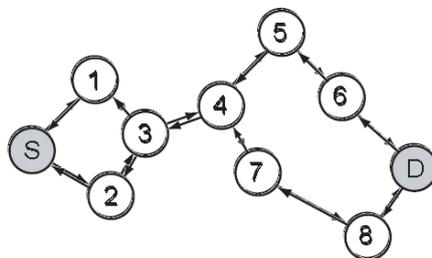

Figure 1: Bi-Directional Mobile Network Architecture

II   ANT COLONY BASED ROUTING PROTOCOL

Ant colony based routing algorithm is presented by DiCaro and Dorigo in 1998 is inspired by working of real ants in nature. The essential thought of the subterranean insect calculation is taken from the nourishment looking conduct of genuine ants. At the point when ants scan for sustenance, they begin from their home and stroll toward the nourishment. At the point when a subterranean insect achieves a crossing point, it needs to choose which branch to take next. While strolling ants store pheromone

which denotes the chose course. The grouping of pheromone on a specific way means that its utilization. Different ants are pulled in by these pheromone trails. Because of this autocatalytic response, the briefest way rises quickly. [5][6][7][8]

Drawbacks in Existing Scheme

In existing plan correspondence process, at whatever point any versatile hub distinguishes that the present course which is being used, no longer accessible to help facilitate correspondence than it starts course discovery process. For this each hub communicates time-to-live parcels in the system. Lifetime of these bundles is of max two jumps.

• Every hub that gets time-to-live bundles sends back ACK to the first sender of the parcels. By this ACK hubs check their essence in the system.

• Same methodology is rehashed for in reverse course in the system.

At some point, Time required for this procedure is too long by which correspondence process came to end.

III NEW OPTIMIZED ANT COLONY BASED ROUTE PROTOCOL

Essential system design is comprises of the system hub with source hub which will speak with target hub. Every one of the hubs in the system is associated with each other in the system in irregular way. As all hubs are in remote correspondence system will participate in correspondence process, each hub will act as switch for its correspondence hubs. Starting versatile system arrangement which is considered for routing is spoken to in Figure 2.
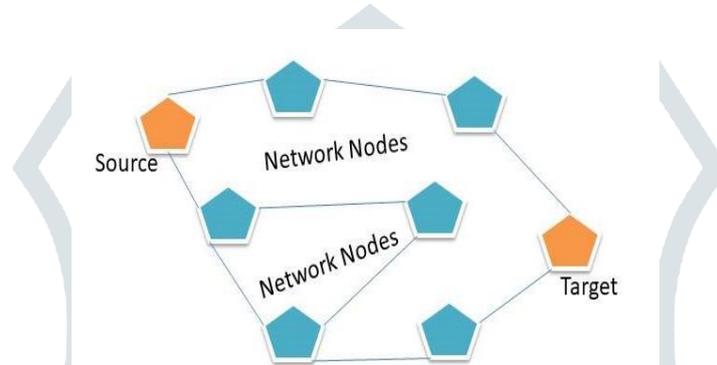

Figure 2: Basic Network Architecture

For accomplishing the system objectives new Maintenance hub are included in the system which will diminish the overhead of the versatile hubs in the system by playing out no. of tasks all things considered keep up organize correspondence way. Maintenance hubs will expand the strength of the system, along with increase the life time of the versatile hubs that performs real correspondence in the system. With the extending system no. of support hubs can be included the system according to the prerequisite of the system. New refreshed system design is spoken to in the underneath Figure 3.
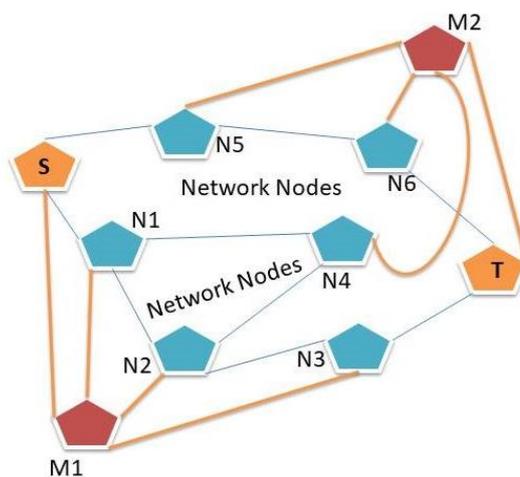

Figure 3: Updated Network Architecture

New included maintenance hubs in the system will function according to the accompanying set standards in the system. All of following working will be performed by the maintenance hub during the maintenance period in taken routing protocol. Figure 4 contains new set communication process.

1. Let, Source hub needs to speak with the target hub in the system through no. of comparing hub in the system.

2. Source hub will forward parcel to correspondence hubs (Node N1, Node N5) which will additionally forward bundle to further hub in the system until parcel reached the target hub.

3. Now Maintenance hub M will hear the correspondence between hubs S, N1... T. Also, will screen the correspondence procedure.

4.   Now Maintenance hub will come in real life when the parcels from any middle of the road hub won't reach to the following hub in the system. For this situation hub M will send a bundle to next hub in the system to guarantee next hub is still in arrange.

5.   If hub M will ready to build up Communication with next hub. That implies current hub and the following hub are not in contact of each other while stay in the system.

6.   At this stage hub M calls for New Route Repair. And mark this as link failure prior to actually link failure.

7.   Further correspondence from hub S to hub T will occur from new course while middle of the road hub will stay in the system.

On account of a connection disappointment, new proposed course repair procedure can be utilized as a part of the system accepting that further no correspondence between two hubs will take place. For this new course will be resolved according to following new characterized rules:

8.   Firstly support hub will check the hub as moved out of the system and hub is never again accessible for the current correspondence process.

9.   Node M will send parcels to correspondence hub in the systems for removing entry for that specific hub from directing data.

10.   At this time, Exiting interchange path in the system is looked up. As no of ways may exist in a similar framework for same correspondence process, which will provide speedup communication process instead of new route discovery.

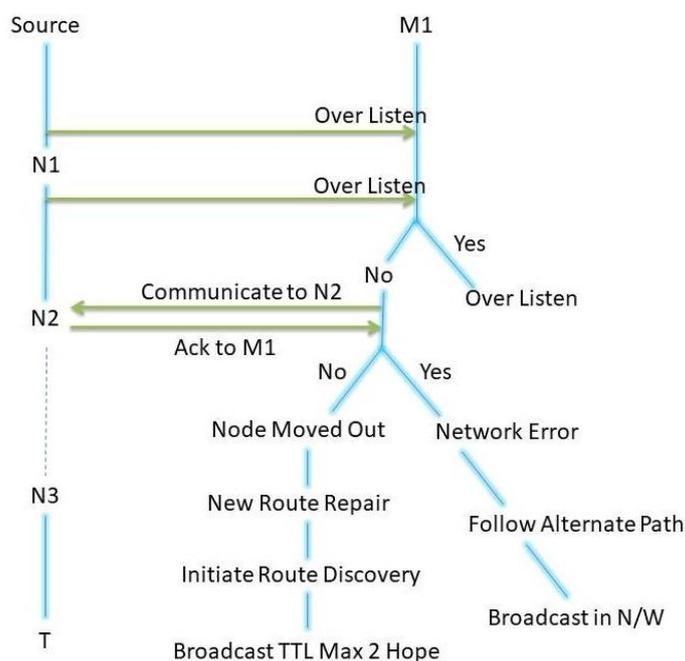11.   If no substitute way in the system discovered at that point. Route discovery process will initiate.

Figure 4: Communication Process in Updated Network Architecture

IV   IMPLEMENTATION

For the implementation of this proposed communication process figure 5 contains the routing table that is randomly generated as per the taken network configuration. Network architecture is taken from figure 3 presented above. Further figure 6 contains the updates network configuration that is obtained by adding new maintenance nodes in the network.

Initially, As Source hub wants to communicate with the target hub Route discovery is initiated in the network. With route discovery it can be found that multiple route are available from source hub to target hub. For communication process route with min cost will be selected. Alternate route will also remain in the routing table at all hubs in the network.

Whenever any delay in the network is detected then maintenance hub will come into act & work as per the preset norms for it in protocol architecture. In this as alternate route is already available in the network whenever any link get down maintenance hub will came into act and prevent route discovery process. Maintenance hub will start packet flood in the network regarding topology change and hubs will update their routing information. Thus further communicate will takes places through new route.

If in case all exiting communication route in the network breakdown then maintenance hub will initial route discovery process. Figure 7 contains the Bi-Directional representation of network architecture with maintenance hubs in action. All the arrows in the figure 7 represent links from one hub to other in the network with cost to forward packet along them in the network.

```
Initial Network Configuration as follow:
Routing Table At Source
[Nod N1, Nod N5]
[2, 3]
Routing Table At Network Nod N1
[Nod S, Nod N2, Nod N4]
[4, 5, 1]
Routing Table At Network Nod N2
[Nod N1, Nod N3, Nod N4]
[6, 4, 2]
Routing Table At Network Nod N3
[Nod N2, Target]
[5, 3]
Routing Table At Network Nod N4
[Nod N1, Nod N2]
[0, 1]
Routing Table At Network Nod N5
[Nod S, Nod N6]
[4, 0]
Routing Table At Network Nod N6
[Nod N5, Target]
[8, 3]
Routing Table At Target
[Nod N3, Nod N6]
[2, 5]
```

Figure 5: Initial Network Configuration in taken Network Architecture

```
Re - Building Network Configuration by adding Maintenance Nods in network
New Network Configuration as follow:
Routing Table At Source
[Nod N1, Nod N5,  Nod M1]
[2, 3, 1]
Routing Table At Network Nod N1
[Nod S, Nod N2, Nod N4, Nod M1]
[4, 5, 1, 1]
Routing Table At Network Nod N2
[Nod N1, Nod N3, Nod N4, Nod M1]
[6, 4, 2, 1]
Routing Table At Network Nod N3
[Nod N2, Target, Nod M1]
[5, 3, 1]
Routing Table At Network Nod N4
[Nod N1, Nod N2, Nod M2]
[0, 1, 1]
Routing Table At Network Nod N5
[Nod S, Nod N6, Nod M2]
[4, 0, 1]
Routing Table At Network Nod N6
[Nod N5, Target, Nod M2]
[8, 3, 1]
Routing Table At Target
[Nod N3, Nod N6, Nod M2]
[2, 5, 1]
Routing Table At Maintenance Node M1
[Nod S, Nod N1, Nod N2, Nod N3]
[1, 1, 1, 1]
Routing Table At Maintenance Node M2
[Nod N4, Nod N5, Nod N6, Target]
[1, 1, 1, 1]
```

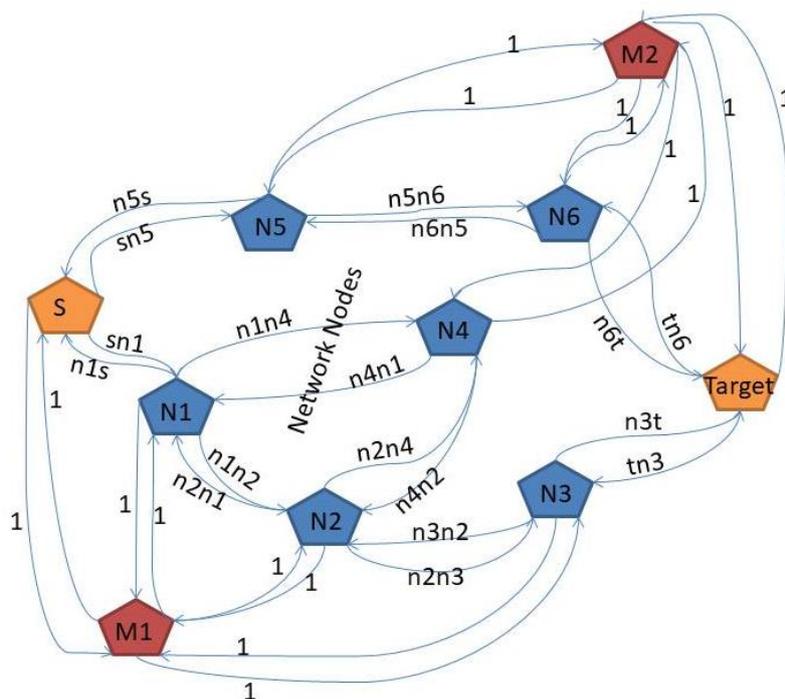Figure 6: Updated Network Configuration in taken Network Architecture

Figure 7: Bi-Directional Representation Of Taken Network Architecture

V CONCLUSION

The work exhibited in this proposal is centered around the enhancing the communication process along with decreasing the overhead of the hubs in the wireless sensor network. That is based on Ant based directing routing Scheme for versatile networks. The new proposed Algorithms beat the significant disadvantages of course and provide system improvement. In the new calculation another hub named as maintenance hub is included each system, Major part of the maintenance hub to screen the working of the system and provide stability with longer link-life in the network. Major of overhead of the hubs in the network will be reduced by this implementation. Communication bandwidth will remain available for the actual data packet instead of forwarding route discovery packets in the network.

REFERENCES

[1] Al-Karakin J.N., Kamal A.E. Routing Techniques in Wireless Sensor Networks: A Survey. IEEE Wirel. Commun. 2004;11:6–28.

[2] Chang J.H., Tassiulas L. Energy Conserving Routing in Wireless Ad Hoc Networks. Proceedings of the 19th Conference of the IEEE Communications Society (INFOCOM); Tel-Aviv Israel. March, 2000; pp. 22–31.

[3] Shah R.C., Rabaey J.M. Energy Aware Routing for Low Energy Ad Hoc Sensor Networks. Proceedings of the Wireless Communications and Networking Conference (WCNC); Orlando, FL, USA. March, 2002; pp. 350–355.

[4] De S., Qiao C., Wu H. Meshed Multipath Routing with Selective Forwarding: an Efficient Strategy in Wireless Sensor Networks. Comput. Netw. 2003;43:481–497.

[5] Braginsky D., Estrin D. Rumor Routing Algorithm for Sensor Networks. Proceedings of the First ACM International Workshop on Wireless Sensor Networks and Applications (WSNA); Atlanta, GA, USA. September, 2002; pp. 22–31.

[6] Yao Y., Gehrke J. The Cougar Approach to In-Network Query Processing in Sensor Networks. SIGMOD Rec. 2002;31:9–18.

[7] Rao A., Ratnasamy S., Papadimitriou C., Shenker S., Stoica I. Geographic Routing without Location Information. Proceedings of the Ninth Annual International Conference on Mobile Computing and Networking (MOBICOM); San Diego, CA, USA. September, 2003; pp. 96–108.

[8] Seada K., Helmy A. Geographic Protocols in Sensor Networks. Computer Science Department, University of Southern California; San Diego, CA, USA: 2008. Technical Report 04-837.