Volume 5, Issue 5, May 2015 ISSN: 2277 128X
International Journal of Advanced Research in Computer Science and Software Engineering
Research Paper
Available online at: www.ijarcsse.com

A Novel Approach to Zone Routing Protocol

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Abstract: ***A mobile ad hoc network (MANET) is comprised of mobile hosts that can communicate with each other using wireless links. Zone routing protocol make use of both reactive and proactive schemes. The proactive scheme is used for all the nodes. Zone routing Protocol could be used both in various network environments by setting proper zone radius.The main aim and objective of this paper is to study and analyse energy manangement in zone routing protocol,optical configuring the zone routing protocol, scalable unidirectional routing with zone routing protocol.***

Keywords: OLSR, DSDV, IARP, TBRPF

I. INTRODUCTION

A mobile ad hoc network (MANET) is comprised of mobile hosts that can communicate with each other using wireless links. A route which is between two hosts may have hops through one or more nodes in the MANET. A routing algorithm for the adhoc networks should not only have the general characteristics of any routing protocol but have various characterstics the of a mobile environment, particularly-bandwidth problem, energy delimiters and various mobility problems.

1.1 Protocols used in Ad hoc network:

Protocols are classified into three categories proactive reactive and hybrid. In proactive or table driven routing protocol, each node maintains a routing table. The table size is very large as it contains information about all the nodes in the network.

- route discovery process initiates the on demand routing protocols when it is needed.
- Hybrid protocols like ZRP, TORA combine the salient features of both proactive and reactive protocols

1.2 Routing algorithms used in Ad hoc network:

A routing algorithm used in ad hoc networks in which each node belong to the two network. A temporary address concatenates node's address on the two different networks. . The node that belonges to the source's physical networks and virtual networks are polled about the address of the destination.These algorithms keeps current routing information between every pair of nodes in the network by proactively propagating route updates at fixed time intervals. The network topology is initiates pro-active routing protocol before a request comes in for forwarding. The proactive routing algorithm maintains routing tables for all nodes in the network. Here are the various Examples of proactive protocols are (DSDV), Optimized Link-State Routing (OLSR)and
Topology-Based Reverse Path Forwarding (TBRPF) Protocols.

1.3 Zone Routing Protocol:

This protocol uses both the proactive as well as reactive schemes. The nodes within the zone uses the above scheme which is the Hop Count (HC) and the reactive scheme is used for all the other nodes in the network excluding the nodes which are having a particular zone radius . The Zone Routing Protocol covers various network environments by setting proper zone radius.

- **Intra Zone Routing Protocol:**

The nodes within the zone use proactive routing. In this, nodes which are within the zone records the routing information to the destination node DN . The path to the DN is determined by referring to the routing table. This category of protocol comes under IntrA zone Routing Protocol (IARP).

- **Inter Zone Routing Protocol:**

when the data in ZRP resides outside the coverage of zone radius , it is a reactive routing and is called Inter Routing Protocol that is IERP.

II. THE ZONE ROUTING PROTOCOL

As seen, proactive routing uses excess bandwidth in order to maintain routing information . The whole network is flodded by reactive routing for determination of route. The ZRP Protocol defines various problems by combining the

best properties We can classify ZRP as hybrid or reactive/proactive routing protocol, In an adhoc network the longest part of the traffic would be directed to nearby nodes. Therefore, in ZRP the scope of the proactive is minimized to a zone which is centered on each node. The maintenance of routing information can be done easily. querying all the network nodes. Despite using zone. Therefore, the overhead which is related to hierarchical protocols can be easily discarded. These protocols are dependent on the strategic assignment of gateways , so that all levels can be accesed by nodes, mainly the top level. Nodes that should send their belonging to communication to asubnet that is common to both nodes. Congestion may occur in the parts of the network. We can categorise ZRP canbe as a flatprotocol because different zones overlap eachother. Hence, routes can be detected and congestion in the network can be reduced.
Further, ZRP has adaptive nature. The behavior basically depends on the recent configuration of the network and the behavior of the various users.

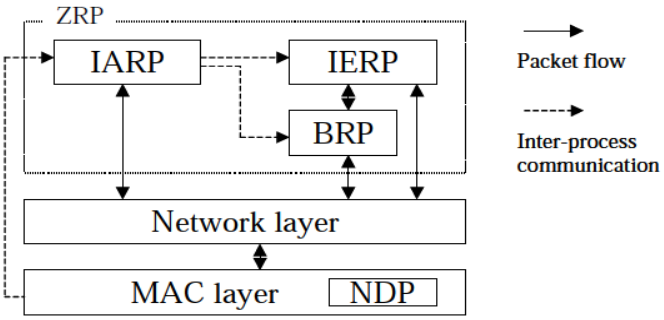

Figure 2: ZRP architecture

2.3 Routing

A node that has a packet to send first checks whether the destination is within its local zone using information provided by IARP. In that case, we can send the packet proactively. Reactive routing is basically used if the final destination is outside the zone.
The reactive routing process is basically divided into into two phases:
The two phases are defined as ***route request*** phase and the ***route reply*** phase. In case of the route request, the source node sends a route request packet to its peripheral nodes using BRP. If the receiver of a packet knows the destination,.packet to its peripheral nodes using BRP. Otherwise, it continues by the process of broadcasting the packet. In this way, the packet of the route request is spreaded throughout the network. In case If a node receives several different copies of the same route request, redundancy would be there and are discarded .The reply is sent by any node that can provide a route to the destination. In order to send the reply back to the source node, routing information must be accomplished when the request is broadcasted through the network. The information is accomplished as either in case of the route request packet, or as in case of next-hop addresses in the nodes along the path. The nodes forwarding a route request packet basically attach their address and relevant node/link metric along with the packet. When the packet reached its destination, the route reply packet sequence is reversed and copied to route reply packet. The sequence is used for forwading the reply back to the source. while as the request and reply packets are smaller.The source can receive the complete source route to the destination. Alternatively, the nodes which are along the path to the destination usually record the next-hop address in their routing table. In this process the node which is broadcasting sends a route request packet to each of its nearby nodes. These types of one-to-many transmission processes can be implemented as multicast to reduce usage of resource.There is another approach is to let the source to be computed as the multicast tree and attach routing instructions to the packet. This process is basically called as the Root-Directed Bordercasting (RDB). Another hybrid approach is basically to reconstruct the tree at each phase of the node, but the instructions of the routing can be easily omitted. This process basically requires that each interior node knows the topology seen by the various bordercasting nodes. Thus, the nodes should maintain an extention routing zone with radius 2□-*1* hops. Note that in this case the peripheral nodes where the request is sent are still at the distance . This aprocess is basically named as Distributed Bordercasting (DB).

2.4 Route maintenance

Route maintenance is specially very necessary in ad-hoc networks, where various links are broken and are established when nodes move relatively to each other with the limitation of radio coverage. In various reactive routing protocols, routes which contains broken links fail and a new routes are discovered or route repair must be importantly performed. when the new route is available, packets are dropped or delayed .In ZRP, the knowledge of the local topology can be used for route maintenance. Links which are failed and routes which are suboptimal segments within one particular zone can be bypassed. packets which are incoming can be accomplished around the broken link through an active multi-hop path. In the same case, the topology can be easily used to shorten the routes, radio coverage.

III. LITERATURE SURVEY

The various approaches used for the prevention and detection of zone routing protocol in Wireless Mesh Networks is described below:

A. Energy Management in Zone Routing Protocol (ZRP)

Ad hoc networks are wireless networks without a fixed infrastructure, and are usually established on a temporary basis for a specific application like emergency rescue or battle field communication. Energy management in wireless networks deals with the process of managing energy resources by having a control over the the battery dissimiation, adjustment of the transmission power, and managing of electricity and power sources so that the lifetime of the nodes can be increased of an ad hoc wireless network. Since, most of the mobile nodes in the network are having low power batteries systems, it could be difficult task for a mobile device to get maintained for a long time if it send and receive data more often. To mitigate this effect here we give the description of the power management issues in mobile nodes using modified Zone Routing Protocol (ZRP) and it was simulated using NS2 simulator.

B. Zone Routing Protocol Using Anycast Addressing For Ad-Hoc Network".

Zone Routing Protocol (ZRP) is a hybrid protocol that combines the advantages of both the proactive and reactive protocols. It is classified as: Intra Zone Routing, which uses hop count of the neighbours using proactive techniques and Inter Zone Routing, which includes the rest of the network excluding the N-neighbors using reactive techniques.

C. Improved Zone Routing Protocol with Reliability and Security using Qual Net Network Simulator"

Zone Routing Protocol is a hybrid routing protocol in MANET. In real life scenario some links in MANET are unreliable due to interfering signals from neighboring network, ambient noise in the system and jamming signals. These links are not accounted for in ZRP resulting in lower throughput, higher end-to-end delay and jitter. Furthermore zone radius is fixed in ZRP resulting in frequent zone switching for highly mobile nodes thereby increasing the control and maintenance overhead. Furthermore in ZRP border casting is used which does not guarantees shortest routing path and as consequence MZRPwas developed which uses broadcasting and guarantees shortest path but with no path reliability and fixed zonal radius. We propose modified secure and efficient version of the MZRP coined as M2ZRP which takes into account the linkSNR value as a measure of its reliability and security and also introduces the concept of variable zone radius. QualNet network simulator is used to evaluate the performance ofM2ZRP over ZRP and MZRP in two different network scenarios consisting of 50 and 80 mobile nodes respectively considering two different models of mobility.

D. Minimizing Delay and Maximizing Lifetime for Wireless Sensor Networks With Anycast"

In this paper, we are interested in minimizing the delay and maximizing the lifetime of event-driven wireless sensor networks, in which various events accomplished infrequently. In such type of systems,maximum of the energy is utilised when the nodes are going on, waiting for an arrival to occur.

E. Determining the Optimal Configuration for the Zone Routing Protocol

In this paper,we address the issue of configuring the ZRP to provide the best performance for a particular network at any time. In the previous papers we have described that an optimally configured ZRP operates atleast as efficiently as traditional reactive flood-search or proactive distance vector/link state routing protocols. Adaptation of the ZRP to changing network conditions requires both an understanding of how theZRP reacts to changes in network behavior and a mechanism to allow individual nodes to identify these changes given only limited knowledge of the network behavior. In the first half of this paper,we have described the effect of relative density.

F. "Scalable Unidirectional Routing with Zone Routing Protocol (ZRP) Extensions for Mobile Ad-Hoc Networks"

The author was proposed a new method to reduce the consumption of power using ZRP protocol and since the design and simulation is in initial stages, the protocol was tested with less number of packets and only for packet level consumption of power. In future this protocol successfully simulate it for a very large network and implement it with a voice application to study the performance and efficiency of the PE ZRP protocol. Also, control of the power can be used to dynamically adjusted.

ALGORITHMS& TECHNIQUES USED	**AUTHOR & YEAR**	**FINDINGS**
Energy Management in zone routing protocol	Ravilla dilli in 2012	It Manages energy resources by means of controlling the battery discharge, adjusting the transmission power, and scheduling of power sources
Zone Routing Protocol using anycast	Tapaswini Dash in 2012	It uses hop count of the neighbours using proactive techniques and Inter Zone Routing,
Improved Zone	Saurav	It is used to evaluate the performance. ofM2ZRP over ZRP and MZRP in two different network scenarios

routing protocol with reliability and security	Ghosh in 2012	
Minimizing delay and maximizing lifetime of wireless sensor networks using anycast	Prasun Sinha in 2012	It Shows how to optimize the anycast forwarding schemes for minimizing the expected packet-delivery delays from the sensor nodes to the sink..
Optimal configuration of zone routing Protocol	Zygmunt in 1999	The zone routing protocol (ZRP) is a hybrid routing protocol that proactively maintains routes within a local region ofthe network
Scalable unidirectional routing with zone routing protocol	Prasun Sinha	Routes data from source to destination

IV. CONCLUSION

In ZRP, the packets are forwarded with full power without considering the node's position inside the zone. According to Inverse Square Law, the received power is inversely proportional to square of the distance between the nodes. The node could waste power if the distance between the sender and the receiver node is less. As the distance between the sender and border nodes increases, the zone area will also increase that means the radio coverage of the sender node will not be able to reach the border nodes in the zone. Due to this reason, the sender node will increase the no. of broadcasts to find the border nodes in the zone, that will enhances bandwidth utilization

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[3] **"Improved Zone Routing Protocol with Reliability and Security using QualNet Network Simulator"** by Saurav Ghosh.

[4] **"Minimizing Delay and Maximizing Lifetime for Wireless Sensor Networks With Anycast"**, Joohwan Kim, Student Member, *IEEE*, Xiaojun Lin, Member, IEEE, Ness B. Shroff, Fellow, *IEEE*, and Prasun Sinha.

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[6] **"Scalable Unidirectional Routing with Zone Routing Protocol (ZRP) Extensions for Mobile Ad-Hoc Networks" by** Prasun Sinha.

