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WINGS TO YOUR THOUGHTS.....

Enhanced ZRP with Any cast Routing in MANET

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Abstract- The Zone Routing Protocol is based on the zone's concept. A routing zone is defined for each node and also defined for the zones of neighboring node overlap. Energy management in network deals with the process to manage energy resources such as controlling the battery, scheduling of power sources and adjusting the transmission power so as to increase the lifetime of the node. As the mobile nodes in the network are with low power battery so it is very difficult for a device to sustain for a long time. The research objective is to study methods to reduce the power consumption using ZRP protocols.

Keywords- Zone Routing Protocol (ZRP), Routing Algorithms, Routing Protocols, Intra Zone Routing Protocol (IARP), Inter Zone Routing Protocol (IERP).

1. INTRODUCTION

A mobile ad hoc network (MANET) consists of mobile hosts that can communicate to each other using wireless links. A route between two hosts may consist of hops through one or more nodes in the MANET [1]. A routing algorithm has the general characteristics of any routing protocol and also has the specific characteristics of a mobile environment, specially - bandwidth, energy limitations and mobility. Routing algorithms and protocols need to save both bandwidth and energy and must take into account the low capacity and limited processing power of wireless devices [15].

2. PROTOCOLS USED IN AD HOC NETWORK

Protocols are classified as: proactive such as OSLR, reactive such as AODV and hybrid such as ZRP.

A. OSLR:

The Optimized Link State Routing Protocol is an IP routing protocol which can be used on wireless ad hoc networks. It is a proactive routing protocol, which uses topology control (TC) messages to discover every hop and then disseminate link state information. It is also known as table driven routing protocol in which every

node maintains a routing table consisting of information of the network topology. The routing table contents changes with time due to the topology change as a result of node mobility. The table size is large as it contains information of all the nodes in the network.

B. AODV:

Ad-hoc On-Demand Distance Vector routing is a reactive routing protocol for MANETs and other wireless ad hoc networks. In this, the network is idle until a connection is needed. The network node broadcasts a request for connection if required. Reactive/on demand routing protocol dynamically initiates the route discovery process when needed. It is a lazy approach and its main aim is to reduce the size and maintenance overhead of the routing table.

C. ZRP:

Zone Routing Protocol or ZRP is a hybrid Wireless Networking routing protocol that uses both proactive and reactive routing protocols when sending information over the network. ZRP was designed to speed up delivery and reduce processing overhead by selecting the most efficient type of protocol to use throughout the route.

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3. ROUTING ALGORITHMS IN AD HOC NETWORK

A routing algorithm for ad hoc networks in which each node belongs to the two networks in a routing algorithm [15]. The first one is physical network and second one is a virtual network. Routing algorithm is based on temporary addresses. A node is required a new temporary address when physical migration occurs. The source initiates a query phase when the source wants to communicate to a node, in which the nodes that belong to the physical networks and virtual networks of source are polled about the address of the sink.

A. Proactive Routing Algorithm:

The Proactive routing algorithms aim to keep consistent and up-to-date routing information between every pair of nodes in the network by proactively propagating route updates at fixed time intervals. The pro-active routing protocol learns the network topology before a request comes in for forwarding. Since the proactive routing algorithm maintains routing tables for all nodes in the network, a route is found as soon as it is requested. The advantage of these protocols is low latency in discovering new routes and minimizes the end-to-end delay.

B. Reactive Routing Algorithm:

Reactive routing algorithms make a route to a given target only when a node requests for route. It initiates a route discovery process. It is also called On-demand Routing Algorithm. A route has been established, the node keeps it until the destination is no longer accessible. The re-active routing protocol becomes active only when a node is willing to forward a request. Reactive protocols are more efficient than proactive protocols because routes are only created when needed. Some of the re-active routing protocols are Dynamic Source Routing Protocol (DSR), Ad Hoc On-Demand Distance-Vector Routing Protocol (AODV), Temporally Ordered Routing Algorithm (TORA), Associativity-Based Routing (ABR) and Preferred Link-Based Routing Protocol (PLBR)[2][1].

4. ZONE ROUTING PROTOCOL

This protocol uses both the proactive and reactive schemes. The proactive scheme is used for all the nodes within the zone radius which is the Hop Count (HC) and the reactive scheme is used for all the other

nodes in the network excluding the nodes in zone radius.

5. ARCHITECTURE

The Zone Routing Protocol, as its name implies, is based on the concept of zones [9]. A routing zone is defined for each and every node separately. It is also defined for the zones of neighboring nodes which overlap. The routing zone has a radius r expressed in terms of hops. The zone includes those nodes, whose distance from the node is at most r hops.

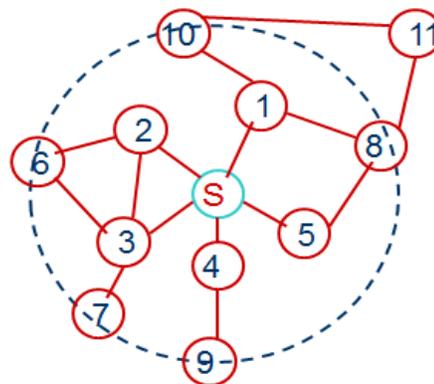


Figure 1- Routing Zone

A routing zone for node S of radius 2 is shown in above figure 1. The nodes from 1 to 10 belong to the routing zone of S, but not node 11. The nodes 6 to 10 are called peripheral nodes because hop distance from S is equal to radius of the routing zone. The information about neighbors is required to construct a routing zone of a given node. A neighbor is defined as a node for that node that communication can be established directly.

The Zone Routing Protocol can be used in various network environments by setting proper zone radius.

A. Intra Zone Routing Protocol:

The nodes within the zone use proactive routing. In this, each node within the zone records the routing information to the destination node DN in the routing table. When there is a request the path to the DN is determined by referring to the routing table. It is called Intra zone Routing Protocol (IARP) [12]. Node S generates the IARP packet periodically with a Hop Count (HC) and sends it to A, B, and C, which are its neighbouring nodes in fig 2.

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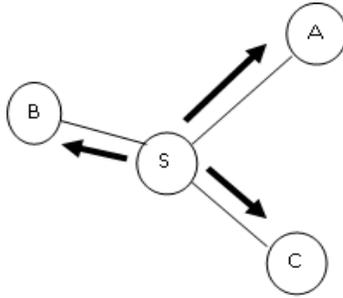


Figure 2- Transmission of IARP packets from S

B. Inter Zone Routing Protocol:

In ZRP, when the data is sending outside the zone radius of the source, it is a reactive routing and is called Inter Routing Protocol (IERP) [13]. In fig.3 the SN now knows the route to the DN=D and hence, it sends the data packet to D via the route

S-C-I-D

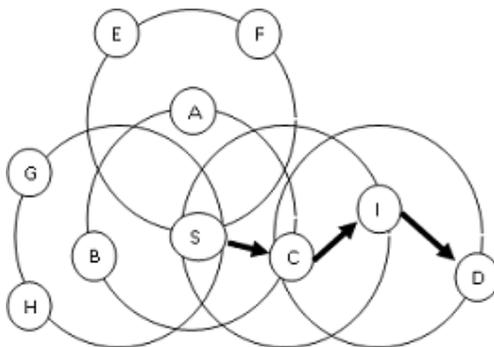


Figure 3- Transmission of IERP packets

6. RELATED STUDY

In [1], **Ravilla Dilli in May 2012**, describes energy management in wireless networks deals with the process of managing energy resources by means of controlling the battery discharge, adjusting the transmission power and scheduling of power sources so as to increase the lifetime of the nodes of an ad hoc wireless network. Since, most of the mobile nodes in the network are equipped with low power batteries, it could be difficult for a mobile device to sustain for a long time if it send and receive data more often.

In [2], **Tapaswini Dash in june 2012**, used the concept of anycast in Zone Routing Protocol

assuming the destination as a member of anycast address, hence the packet can be sent to any of the other member of the anycast group which is located nearer to the source node. A single anycast address is assigned to various nodes. One member of that anycast address communicates with the originator at a time. Anycast has a stateless nature. This leads to serious problem in that stateful protocol like TCP cannot be supported.

In [3], **Saurav Ghosh** proposed modified secure and efficient version of the MZRP[3] coined as M2ZRP[3] which takes into account the link SNR 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 of M2ZRP over ZRP and MZRP in two different network scenarios consisting of 50 and 80 mobile nodes respectively considering two different mobility models i.e. Random Way Point (RWP) and Group mobility model (GM). Results indicate a considerable improvement in throughput, end-to-end delay and jitter with enhanced reliability and security.

In [4], **Joohwan Kim** was interested in minimizing delay and maximizing the lifetime of WSN with for which events occur infrequently. Most of the energy is consumed in such systems when the radios are on, waiting for an arrival to occur. The author firstly studied how to optimize the anycast forwarding schemes for minimizing the delays from the sensor nodes to the destination. Based on this result, the author provides a solution.

In [5], **Marc R. Pearlman in August 1999**, addressed the issue of configuring the ZRP to provide the best performance for a particular network at any time. A configured ZRP operates efficiently reactive search or proactive distance vector routing protocols. Adaptation of the Zone Routing Protocol requires both for changing network conditions.

In [6], **Prasun Sinha** considered a routing protocol called the Zone Routing Protocol that has been proposed for MANETs with bi-directional links. The ZRP uses a hybrid (proactive and reactive)

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methodology to provide scalable routing in MANETs. However, some routes remain undiscovered in the presence of unidirectional links if Zone Routing Protocol is used. The author proposed extensions to ZRP when unidirectional links are present. The author proposed a query enhancement mechanism that repeatedly builds partial routes to a destination.

In [7], **P. Sateesh Kumar** proposed a new protocol called Genetic Zone Routing Protocol (GZRP) which uses simple genetic algorithm for finding multiple shortest (near shortest sometimes) paths to provide load balancing and tolerance. Any on-demand routing protocol uses two procedures i.e. Route Discovery and Route maintenance.

7. CONCLUSION

Whenever the node forwards a packet to the intermediate or border node in the zone it uses the maximum power to reach the destination. The two main issues in existing work are power management and bandwidth utilization. The reason for creating a dynamically changing zone is - if a node has no border nodes elected but full of intermediate nodes elected then the intermediate nodes inside the zone will not be able to talk with its neighboring zone nodes.

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