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A REVIEW ON ENERGY EFFICIENT ROUTING IN MOBILE AD-HOC NETWORKS (MANET)

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ABSTRACT

One of the limitations of mobile ad-hoc network is their inherent limited energy resource. Besides maximizing the lifetime of the sensor node, it is preferable to distribute the energy dissipated throughout the wireless network in order to minimize maintenance and maximize overall system performance. Any communication protocol that involves synchronization of peer nodes incurs some overhead for setting up the communication. So here we study various energy-efficient routing algorithms and compare among themselves. We take into account the distance calculation costs and analyze the energy-efficiency and the useful lifetime of the system. In this proposed work we will develop a algorithm that calculate the minimum distance dynamically from source node to destination node in minimum amount of time and hence saving energy. Purposed system will save the energy on the basis of time to calculate the distance between two nodes

KEYWORDS: Energy Efficient Routing, Dynamic routing, Manet.

INTRODUCTION

Mobile ad-hoc network is a collection of two or more wireless mobile nodes. No infrastructure is required in manet. Each node act as a router and forward data packets to other nodes. No base station is required in these networks. Communication between these nodes can be achieved using multihop wireless link. Since nodes are independent to move freely in any direction so they may occur link failure or breakage. Due to dynamic topology it has been a challenging task to develop a routing protocol for manet. Bandwidth constraint and resource constraint nodes are also the challenging task. There are various proactive, reactive and hybrid protocols ad-hoc routing protocols are generally classified into table driven protocols and on-demand routing protocols. Table driven routing protocols are also called proactive protocols. They maintain route all the time within the networks on the other hand on-demand routing protocols are also called reactive protocols. Third protocol is hybrid routing protocol basically hybrid is combination of both reactive and proactive protocols and it overcomes the shortages of these protocols. Basically reactive routing protocols are AODV, DSR, LAR, TORA and proactive protocols are HSR (hierarchical state routing, GSR (global state routing), DSDV (destination sequenced distance vector) and hybrid routing protocol are ZRP(zone based routing), Cbr etc.
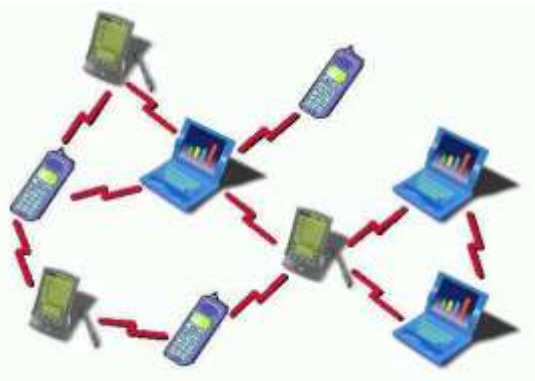
MANET Applications of Manet

Mobile ad-hoc networks operates as a standalone network or works with one or more point of attachment to cellular network. Basic applications of ad-hoc network are:

i. Tactical networks
ii. Emergency services
iii. Commercial and civilization
iv. Home and enterprise networking
v. Education
vi. Entertainment
vii. Sensor networks.

CHARACTERISTICS OF ROUTING PROTOCOLS
Table-driven routing (proactive)
This type of protocols maintains fresh lists of destinations and their routes by periodically distributing routing tables throughout the network. The main disadvantages of such algorithms are respective amount of data for maintenance and Slow reaction on restructuring and failures. Examples of proactive algorithms are Optimised link state routing(OLSR) and Destination Sequenced Distance Vector(DSDV)

On-demand routing (reactive)
This type of protocol finds a route on demand by flooding the network with Route Request packets. The main disadvantages of such algorithms are the high latency time in route finding and excessive flooding can lead to network clogging. Examples of on-demand algorithms are: Ad hoc On-demand Distance Vector (AODV), Dynamic Source Routing (DSR), Flow State in the Dynamic Source Routing, Power-Aware DSR-based

Hybrid (both proactive and reactive) routing
This type of protocol combines the advantages of proactive and reactive routing. The routing is initially established with some proactively prospected routes and then serves the demand from additionally activated nodes through reactive flooding. The choice of one or the other method requires predetermination for typical cases. The main disadvantages of such algorithms are advantage depends on number of other nodes activated and reaction to traffic demand depends on gradient of traffic volume. Examples of hybrid algorithms are ZRP (Zone Routing Protocol). ZRP uses IARP as pro-active and IERP as reactive component.

Hierarchical routing protocols
With this type of protocol the choice of proactive and of reactive routing depends on the hierarchic level in which a node resides. The routing is initially established with some proactively prospected routes and then serves the demand from additionally activated nodes through reactive flooding on the lower levels. The choice for one or the other method requires proper attribution for respective levels. The main disadvantages of such algorithms are advantage depends on depth of nesting and addressing scheme and reaction to traffic demand depends on meshing parameters. Examples of hierarchical routing algorithms are CBRP (Cluster Based Routing Protocol) FSR (Fisheye State Routing protocol).

LITERATURE SURVEY
R.Senthil Kumar, Dr. C. Suresh Kumar , Minimizing the route rediscovery process in manet.
In this paper, authors proposed a novel method to Minimizing the Route Rediscovery Process based Protocol (MRRP) by scheming the RREQ packet to select the more stable route and reduce the link break. The proposed protocol has two schemes, Received Signal Strength(RSS) based to minimizing the route rediscover process and the optimization of flooding process , based on Time-to-Live (TTL) value , reducing route rediscovery process solution to accomplish the link failure. By verifying the results, it improves the effectiveness and network performance of Quality of Service (QoS).

Shruti Verma, Pushpa Singh, Energy Efficient Routing in MANET: A Survey
In this paper, author surveyed a number of energy efficient routing protocols and compare these protocols with each other directly since each protocol has a different goal with different assumptions and employs mechanisms to achieve the goal. According to the study, these protocols have different strengths and drawbacks. A routing protocol can hardly satisfy all requirements. In other words, one routing protocol cannot be a solution for all energy efficient protocol that designed to provide the maximum possible requirements, according to certain required scenarios

Jaya Jacob , V. Seethalakshmi , Efficiency Enhancement of routing protocol in manet
This paper evaluates the performance of various adhoc routing protocols such as DSDV, AODV, DSR, TORA and AOMDV in terms of energy efficiency and it also proposes a new routing algorithm that modifies AOMDV and it provides better performance compared to all the above protocols.

Annapurna P. Patil, Bathey Sharanya, M. P. Dinesh Kumar, and Malavika J., Design and Implementation of Combined Energy Metric AODV (CEM_AODV) Routing Protocol for MANETs
In this paper author concentrate on Emergency search and rescue operations which rely heavily on the availability of the network. The availability is a direct cost of the overall network lifetime, i.e., energy of the nodes. There are many strategies available at different levels of the OSI model to improve the network lifetime. The focus is on developing a network layer strategy, i.e., one that uses routing protocols. AODV protocol is seen to be the most energy efficient protocol. Firstly we select two existing energy efficient routing protocols based on AODV, each of which is based on a different energy cost metric. And then design a protocol that is a combination of both, hence a combination of two energy cost metrics. Secondly we evaluate the performance of this protocol against the single energy metric AODV protocol and against traditional AODV. The performance metrics used for evaluation are packet delivery ratio, throughput, convergence time, network lifetime and average energy consumed.

EXISTING TECHNIQUES
PH-AODV routing algorithm
Comparing with AODV, the proposed PH-AODV protocol aims to achieve better throughput, better average end to end delay and better average drop packets. PH-AODV is a distance vector reactive routing protocol that combines the node power level and the hop count parameters to select better routing path. Similar to AODV, When a source node that seeks sending data packets to a destination node, PHAODV checks the source route table for a valid route to the destination node, if exists, it forwards the data packets to the next hop along the way to the destination. On the other hand, if a valid route is not existing in the route table of the source node, it starts a route discovery process by broadcasting a RREQ (The RREQ contains the internet protocol (IP) addresses of the source and destination nodes, current sequence number, the last known sequence number, node power level and hop-count) to its neighbors, Its neighbors forward the RREQ to their neighbors until the RREQ reaches the destination or an intermediate node that has fresh route information.

Reverse AODV routing protocol
The main objective of developing RAODV protocol is to provide solutions to some conditions which rapidly change in the topology of MANET. These conditions cause RREP packet does not reach the source node, especially when a node moves. The RAODV protocol discovers routes on demand using a reverse route discovery procedure. During route discovery procedure, source node and destination node plays the same role from the point of sending control packets. Thus, after receiving RREQ, destination node floods R-RREQ to find the source node. When source node receives an R-RREQ packet, data packet transmission is started immediately.

An Energy Efficient Ad-hoc on demand Routing Protocol for Mobile Ad-hoc Network (EEAODR)
Energy Efficient Ad-hoc on demand Routing Protocol for Mobile Ad-hoc Network (EEAODR) is an improvement over Ad hoc on-demand destination vector protocol that considers power level of each node in the network while calculating the route in order to increase lifetime of the network. The optimization function is used to select the energy efficient path among the all discovered by considering different factors such as nature of packets, their size and distance between nodes. Cost = $\sigma \times$ time + $\mu \times$ 1/minimum battery power of node in route + $\tau \times$ 1/ number of hops. The path that has minimum of the communication cost among all the possible paths between a source and destination node pair is chosen as the best path. In this case, every time we uses different path for sending packet which is not possible in the case of AODV which uses same path every time.

AODV Multipath Routing Protocol (AODVM)
AODVM is an extension to AODV for finding multiple node-disjoint paths. Intermediate nodes are not allowed to send a route reply directly to the source. Also, duplicate RREQ packets are not discarded by intermediate nodes. Instead, all received RREQ packets are recorded in an RREQ table at the intermediate nodes. The destination sends an RREP for all the received RREQ packets. An intermediate node forwards a received RREP packet to the neighbor in the RREQ table that is along the shortest path to the source. To ensure that nodes do not participate in more than

one route, whenever a node overhears one of its neighbors broadcasting an RREP packet, it deletes that neighbor from its RREQ table. Because a node cannot participate in more than one route, the discovered routes must be node-disjoint.

CONCLUSION

Mobile Ad Hoc Networks (MANETs) also called mesh networks are self-configuring networks of mobile devices connected by wireless links. MANETs are deployed in situations where there is no existing infrastructure, such as emergency search and rescue, military, etc. This paper provides overview of Mobile ad-hoc network and discuss how energy is most important in these type of networks and application areas of mobile ad-hoc networks as well as characteristics of routing protocols are discussed. Design of energy efficient routing protocol must address reducing of power consumption from view point of networks as well as nodes. The system to be developed will design a new procedure that reduces the energy consumption and increases the energy utilization of nodes in network.

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