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ROUTING TECHNIQUES IN AD-HOC WIRELESS NETWORK

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Abstract: In mobile ad-hoc wireless network connectivity is always a major issue. Due to dynamic behavior of mobile nodes, good network topology shall be achieved efficiency. In this survey paper some energy efficient load balancing routing algorithms detected recently in many literature. Control over the rapidly change of the topology by minimizing the maximum transmission power in ad hoc wireless networks. Maintain battery power life and network lifetime during the networks connectivity. We suggest to do study of energy-based performance survey of aware routing protocols for wireless mobile ad hoc networks. Existing work based on review of existing research work in ad hoc wireless network and explores the possibilities of new research in these areas.

Keywords: Mobile Ad hoc Networks, Routing Protocols, Energy Efficiency, Review Survey.

I. INTRODUCTION

An ad hoc wireless network is a collection of wireless mobile nodes (hosts) which form a network dynamically. The network topology (the physical connectivity of the communication network) in network changes dynamically. A path followed by data packets from source to a destination through routing protocol in traditional wired networks but in ad hoc network this cannot be applied directly due to highly dynamic topology ,absence of established infrastructure for centralized administration (e.g. base stations) , resource (energy)-constrained nodes , and bandwidth-constrained wireless links. Various routing protocol for ad hoc wireless networks has been evolved in recent past. This is viewed as a suitable system for some specific application such as conferences and meetings, virtual classrooms, emergency search, military communication.

In Ad hoc wireless networks mobile nodes are relies on battery power and hence try to design such an energy efficient routing which provide minimum power consumption. In wireless network if one of node goes to power off it fails to send any packet to the other node. Many researchers have been trying to extend battery power life for communication. Each node in the network acts as host and as a router and sends packet to other nodes for this purpose, a path should be provide minimum power consumption. Energy conservation in mobile nodes becomes very critical issue in ad-hoc mobile network.

The mobile nodes in this network have limited computational and limited battery power life. The network life time is calculated from when the mobile node first time runs on their battery power. The routing protocols should be energy efficient both network and node. The rest of the paper is structured as follows. The existing work of ad hoc wireless networks. Section 5 draws the main conclusions of this work.

II. REVIEW OF EXISTING WORK

2.1 Based On Routing Information Update Mechanism.

Ad hoc wireless network routing protocol can be divided into three categories based on the routing information update mechanism. In ad-hoc wireless network are free to move around randomly and establish path between all the nodes for communication through wireless medium within its coverage area and co-operate with each node efficiently. Mobile host independently move anywhere and organize themselves arbitrarily in a network topology. These networks require such type of routing protocols for mobile node in which they have self-starting nature. Topology changes of mobile nodes in the network are rapid, and these are self configure them in the absence any centralized control and administrator .There is three type of mechanism like: table –driven (Proactive) routing protocol, on demand (Reactive) routing protocol and Hybrid routing protocol.

2.1.1 Proactive or table –driven routing protocols:

In table-driven routing protocol, every node maintains the network topology information in the form of routing tables by periodically exchanging routing information. Routing information is flooded in the whole network. When a node want to exchange information to other node it runs an appropriate path finding algorithm through the topology information that maintains. In which cost of the path and reaching to the next hop information kept. Various table-driven protocols are different in storing information about the path that changes in network topology through each node. When entry of any node in the network information regarding this node has send to each node of the network.

2.1.2 Reactive or on demand routing protocols

In protocols of this category do not maintain the network topology information. They create a path whenever they required, by using a connection establishment process. Hence protocols that fall in this category do not exchange routing

information periodically. When a source node wants to send a packet to a destination node it broadcast a query in the network for discovering a path between them. This request for searching a route known as Route-Request (RREQ) packet and process is Route Discovery. The destination node sends a Route Reply (RREP) packet. At the end the source dynamically finds the path to the destination node. Once a path established between two nodes maintained until it becomes unreachable or no longer needed. Although the network topology changes rapidly, the network traffic caused during route discovery process is low as compared to the total communication bandwidth.

2.1.3 Hybrid Routing Protocols:

When small number of nodes is present in a network both proactive and reactive routing protocol work well. If number of nod increases, hybrid protocols are used there to give high performance. In hybrid protocol, reactive routing used as globally while proactive routing operating nodes locally neighborhood. Protocol that fall under this category combine the best features of the above two categories. Nodes present at certain distance from other nodes or within a particular geographic region, are said to be within the routing coverage area of the given node. For routing within this zone, table-driven approach is used.

2.2 BASED ON THE USE OF TEMPORAL INFORMATION FOR ROUTING

Routing protocol of this classification use temporal information used for routing. Due to highly dynamic nature of ad hoc network path breaks are much more frequent than in wired networks, the use of present information regarding the lifetime of wireless links and the significance. This protocol further divided into two categories like: routing protocol using past temporal information, routing protocol that use future temporal information. Routing Protocols of these category keeps Information related to the links or status of links t the time routing to make routing decisions are base on the past status. For example, the routing information based on the availability of wireless links (current /present information) along with a shortest path-finding algorithm, provides a path that maybe efficient and stable at the time of path-finding. The network topology changes may immediately break the path, making the path undergo a resource-wise expensive path reconfiguration process. These routing protocols use information about the expected future status of the wireless links to make approximate routing decisions between source nodes to a destination node. Apart from the lifetime of wireless links, the future status information also includes information regarding the lifetime of the node (based on remaining battery power), prediction of location of node, and prediction of links available between the nodes.

2.3 BASED ON TOPOLOGY INFORMATION ORGANIZATION

Routing protocol based on the topology being used in internet is hierarchical in order to reduce the state information maintained at the central routers. Ad hoc wireless networks, due to relatively smaller number of nodes, can make use of routings a flat topology or a hierarchical topology routing protocols. In flat topology routing protocols, protocols lies in this category use of flat addressing similar to the one used in IEEE 802.3 LANs. It assumes the presence of globally unique addressing for nodes in an ad hoc wireless network. Protocols that fall under this category use logical hierarchy of nodes in the network and an associated addressing feature. The hierarchical topology could be based on geographical information or it could be based on hop distance.

2.4 BASED ON UTILIZATION OF SPECIFIC RESOURCES:

Routing protocols fall under this category provides the minimum power consumption in the network and reduce the control overhead. This routing protocol classified into two categories like:

2.4.1 Power-Aware Routing

Routing protocols of this category try to minimize the consumption of a very important recourse in them ad hoc wireless networks: the battery power. The routing decisions are based on minimizing the power consumption either locally or globally in the network. In a divergence from traditional wired network routing and cellular wireless network routing, power consumption by the nodes is a serious issue to be taken into consideration by routing protocols for ad hoc wireless networks because in ad hoc wireless networks, each node participating in the networks acts as a router and as a host and must therefore require power-constrained equally just as the routers. There is limitation of battery power for operation is a significant barrier, given the requirements of portable devices, weight, and size of mobile devices. Power sources of the network nodes contribute to the efficient utilization of energy and increases the lifetime of the network. The routing protocols that select paths so as to conserve power must be aware of the status of the batteries at the given node as well as at the other intermediate nodes in the path.

This metric aims at minimizing the power consumption of a packet travels from source node to destination node. This is most intuitive metric, however not optimal for maximum battery life. This metric try to balance the routing load among the cut- set (subset of nodes in the network). This connectivity is to be ensured by uniformly distributed the routing load among the cut set. This metric balance the power consumption for all node in the network so that the power consumption pattern remain uniform across them. This metric maximize the life of every node in the network. A node's cost decreases with an increase in its battery charge and vice versa. This metric minimizes the maximum cost per node for a packet after routing of packets or after a specific period and try to delay the node failures.

2.4.2 Geographical Information Assisted Routing:

Routing protocol of this category improves the performance o routing and reduces the control Overhead by effectively utilizing the geographical information available.

2.4.3 Routing With Efficient Flooding

2.4.3.1 Table Driven

Table driven protocols also called proactive routing protocols. This type of routing protocols maintains information in tables. These tables periodically updated information of

randomly changes network topology. When a new node enters in network, routing table update its information in routing table. Each node, routes related to each node calculated whenever they required. When a node wants to exchange information to the other node, it simply utilizes already calculated nodes. Periodic routing protocols needed to keep up to date. But this type of updating information of randomly moving nodes in routing table cause overhead. DSDV, OLSR are example of this type of routing protocols in ad hoc wireless network.

Destination Sequenced Distance Vector (DSDV) is proactive protocol is a loop free distance vector routing by adding sequence number to the node entry in the routing table. Each node maintains routing information about destinations and update information periodically. Route must be selected with the highest sequence number is chooses and if the sequence number of two node same then route will be selected with the highest sequence number and if the same sequence number then route will be selected with highest metric value. Advantages of DSDV provide loop free topology and suitable for dynamic changes in the networks. Disadvantage is it causes overhead and store information about the path which is no longer used. Optimized Link State Routing Protocol (OLSR) is proactive protocols which maintain topology information. This routing protocol is a link state protocol for optimization, which performs hop by hop routing. Route selected on the basis of local information to build global information of the network topology. Advantages of OLSR this protocol decrease overhead. Disadvantage nit consumes more resources than the AODV routing.

2.4.3.2 On Demand

On demand protocols also called reactive routing protocols. This type o routing protocols works on demand. Routes are established whenever they require exchanging information. A sending node initiates routing process. When a source node want to exchange information to a destination node route request packet is sends to every node in the network until it reaches the destination node or a node that is linked with a destination node. As compare to proactive routing protocols these node established path when needed. So no overhead is caused by this routing protocol. DSR, AODV are example of this type of routing protocols. Dynamic source routing (DSR) is an on-demand routing protocol. This protocol provides two mechanisms-route discoveries and route maintenance allow nodes to find path and maintain routes from a source node to a destination node. Both mechanisms work together for initiate a route between source nodes to a destination node in the case of broken path. Advantages of DSR, it does not require to periodic updating. Each node also maintains a cache to keep information about nodes. Ad-hoc on-demand distance vector routing protocol (AODV) is a on-demand routing protocol, which does not require to maintain routes information from every node in the network topology. Route initiated only whenever it requires exchanging information between the nodes. Each node stores information about recent path. Advantage of AODV, the intermediate node has route cache to keep efficient information to reduce the control overhead. Disadvantage of this routing protocol is that when any path break between the nodes it cannot repair locally.

III. CONCLUSIONS

The critical links are weaker links whose failures significantly deteriorate the performance in a network. These links must be detected well in advance to maintain mobile network connectivity. Graph algorithms could well be applied in early detection of critical links. In addition, we observe the need for load balancing around the critical nodes soon after they are located. This might have a greater contribution in two significant perspectives: speeding up the network traffic which had been otherwise deteriorating due to the enormous load handled until then by the critical node; improvising the throughput and reliability of the critical node by recovering it from critical state. We have applied machine learning algorithms for clustering the nodes based on energy efficiency and performing a load balancing. In future, prediction of network traffic patterns and applying the Bayesian belief networks over the clusters to decide upon trust parameters would be of our interest.

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