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Survey: Proactive and Reactive Routing Protocols

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Abstract-Routing is a mechanism to build links or connections between two or more nodes with or without the infrastructure. A **Routing algorithm** is a method for determining the routing of packets in a node. For each node of network, the algorithm determines a routing table, which in each destination, matches an output line. The algorithm should lead to a consistent routing, that is to say without loop. This means that you should not route a packet a node to another node that could send back the package.**There are three main types of routing algorithms-** Vector (distance-vector routing),To link state (link state routing), Path to vector (path-vector routing).This paper focus on the survey of reactive and proactive routing protocols like OLSR, AODV, RIP, OSPF, DSR.

Keywords: **DV,LSR,RIP,DSR, AODV.**

I. INTRODUCTION

Routing is the act of moving information across an inter-network from a source to a destination. Along the way, at least one intermediate node typically is encountered. It's also referred to as the process of choosing a path over which to send the packets. The routing algorithm is the part of the network layer software responsible for deciding which output line an incoming packet should be transmitted on, i.e. what should be the next intermediate node for the packet.

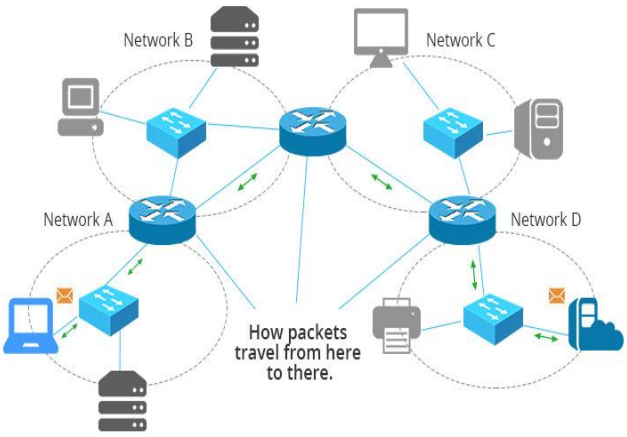

Figure1: Routing

Routing algorithms fill routing tables with a variety of information. Mainly Destination/Next hop associations tell a router that a particular destination can be reached optimally by sending the packet to a particular node representing the "next hop" on the way to the final destination. When a router receives an incoming packet, it checks the destination address and attempts to associate this address with a next hop. Some of the routing algorithm allows a router to have multiple "next hop" for a single destination depending upon best with regard to different metrics.

II. ROUTING Algorithms

Routing protocols use metrics to evaluate what path will be the best for a packet to travel. A *metric* is a standard measurement; such as path bandwidth, reliability, delay, current load on that path etc; that is used by routing algorithms to determine the optimal path to a destination. To aid the process of path determination, routing algorithms initialize and maintain routing tables, which contain route information. Route information varies depending on the routing algorithm used.

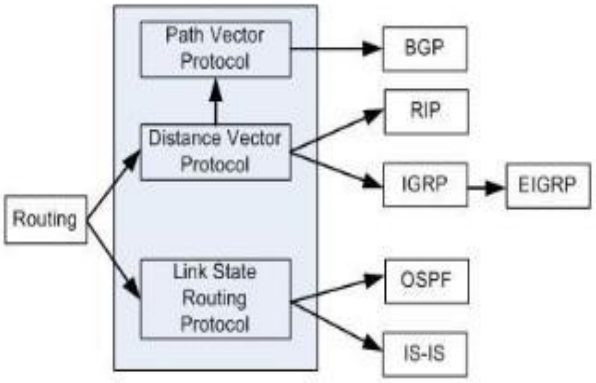

Figure 2: Routing Algorithms.

Distance Vector Protocol:

The **distance-vector routing** is a type of algorithm used by routing protocols to discover routes on an interconnected network. The primary distance-vector routing protocol algorithm is the Bellman-Ford algorithm. Another type of

routing protocol algorithm is the link-state approach. Routingalgorithmthat use distance-vector routing protocols include RIP (**Routing Information Protocol**), Cisco's IGRP (**Internet Gateway Routing Protocol**), and Apple's RTMP (**Routing Table Maintenance Protocol**). The most common link-state routing protocol is OSPF (**Open Shortest Path First**). **Distance-vector routing** refers to a method for exchanging route information. A router will advertise a route as a vector of direction and distance. Direction refers to a port that leads to the next router along the path to the destination, and distance is a metric that indicates the number of hops to the destination, although it may also be an arbitrary value that gives one route precedence over another. Inter network routers exchange this vector information and build route lookup tables from it.

Distance vector protocols are RIP, Interior Gateway Routing Protocol (IGPR).Algorithm where each router exchanges its routing table with each of its neighbors. Each router will then merge the received routing tables with its own table, and then transmit the merged table to its neighbors. This occurs dynamically after a fixed time interval by default, thus requiring significant link overhead.

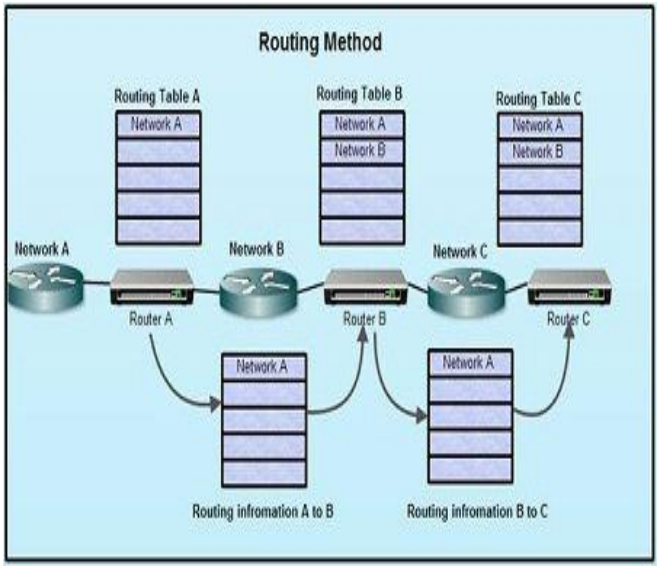

Figure 3: Routing Methods

RIP (Routing Information Protocol):

RIP is the most widely used routing protocol of distance-vector type today. It has been originally designed based on the routing protocol applied to XNS and PUP protocol systems of Xerox (RFC 1058).RIP request is used, by a router upon startup to inquire of its neighbor router about route information to obtain routing information. RIP response includes a destination host address and cost information in the address part. Response is sent to the neighbor router in case of the following:

1. Receipt of RIP request.
2. Regularly Response is sent every 30 seconds even if no RIP request is issued. All routers delete route information from their routing table if no route information is received within a specified period of time. This is intended to allow detection of fault of neighbor router.
3. In case of changes made to routing table contents.If changes are made to the routing table because changes to the network configuration have been detected, information relating to these changes is sent to the neighbor router.

Link-State Protocol :

These are OSPF, IS-IS (Intermediate System to Intermediate System Intra-Domain Routing Exchange Protocol). Algorithm where each router in the network learns the network topology then creates a routing table based on this topology. Each router will send information of its links (Link-State) to its neighbor who will in turn propagate the information to its neighbors, etc. This occurs until all routers have built a topology of the network. Each router will then prune the topology, with itself as the root, choosing the least-cost-path to each router, then build a routing table based on the pruned topology.

In link-state protocols, there are no restrictions in number of hop as in distance-vector protocols, and these are aimed at relatively large networks such as Internet backbones. The load on routers will be large however, since processing is complex.

OSPF (Open Shortest Path First)

OSPF is a link-state type routing protocol developed for use in a large-scale network by eliminating the disadvantages of RIP. This is the only standardized inter-domain protocol for the Internet as of today, and offers the following features.

1. Compatible with hierarchical topology for network
2. Allows use of subnet mask of variable length
3. Allows load distribution when two or more routes are available
4. Supports authorization method for improved security.
5. In OSPF, each domain is divided into several areas. Detailed configuration of each area can be hidden from other areas. Therefore, routers that belong to the same area have the same network configuration information while routers belonging to other areas have different configuration information. Because one area is composed of subnets with serially assigned addresses, external intervention is not necessary to manage the route to reach each address in that area. It is only necessary to manage the route to that area as an integral route to a series of those addresses.

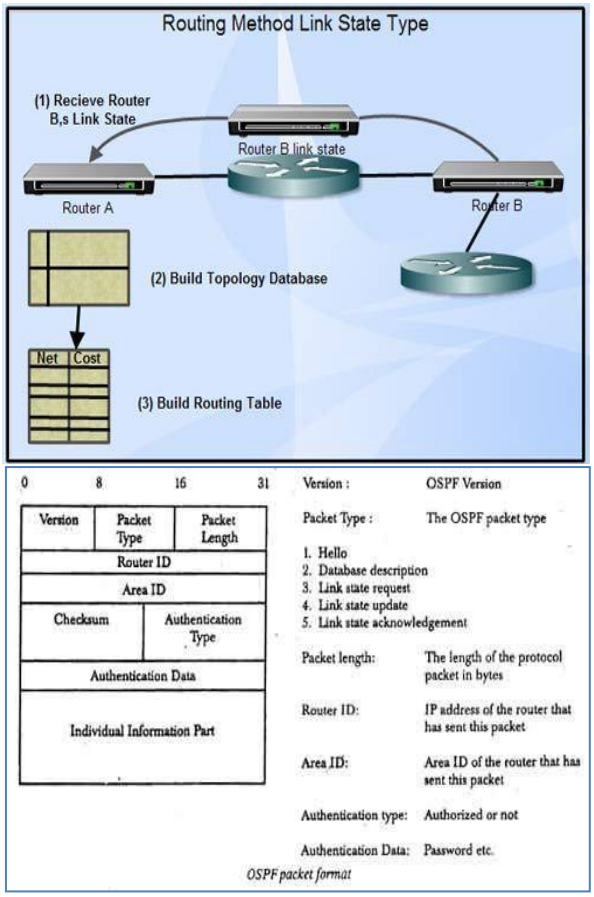

Figure 4: Routing Method-Link State Type

III. PROACTIVE ROUTING PROTOCOLS

InProactiveroutingprotocolseverynodestoreinformationin the form of tables and when any type of change occur in network topology need to update these tables according to update. The node swaps topology information so they have route information any time when required. There is no route discovery delay associated with finding a new route. In proactive routing fixed cost generate, as normally greater than that of a reactive protocols. Proactive protocols Traditional distributed shortest-path protocols Based on periodic updates high routing overhead. Proactive routing protocolsareDSDV(destinationsequenceddemandvector), OLSR(optimizedlinkstateroutingprotocols).

Optimized Link State routing protocol is a proactive link-stateroutingprotocol,whichuseshelloandtopologycontrol (TC) messages to discover and then disseminate link state information throughout the mobile ad-hoc network. Individualnodesutilizethistopologyinformationtoworkout next hop destinations for all nodes in the network usingshortest hop forwardingpaths.Being a proactive protocol, routes to all destinations within the network are known and maintain before using it. Having the routes available within the standard routing table can be useful for some systems and network applications as there is noroutediscoverydelayassociatedwithfindinganewroute. The routing operating cost generates, although commonly greater than that of a reactive protocol and does not increase with the number of routes being created.Being a link-state protocol, OLSR requires a reasonably large amount of bandwidth and CPU power to compute optimal paths inside thenetwork. OLSR is an IP routing protocol optimized for mobile ad-hoc networks which can also be used on other wireless ad-hoc networks. Individual nodes use this topology information to compute next stop destination for all nodes in the network using shortest hop forwarding paths.OLSRv2 maintains many of the key features of the original including MPR selection and dissemination.

MESSAGE:OLSR makes use of "Hello" messages to find its one hop neighborsanditstwohopneighborsthroughtheirresponses. OLSR uses two kinds of the control messages: Hello and Topology Control (TC). Hello messages are used forfinding the information about the link status and the host's neighbors'. by the Hello message the Multipoint Relay (MPR) Selector set is construct which describe which neighbors' has preferred this host to work as MPR and as of thisinformationthehostbeabletoevaluateitsindividualrest of the MPRs. the Hello messages are sent simply singlehopaway but the TC messages are broadcasted throughout the whole network. TC messages are use for distribution information about personal advertised neighbors which includes at least the MPR Selector list. The TC messages be broadcast occasionally and only the MPR hosts can forward the TC messages.

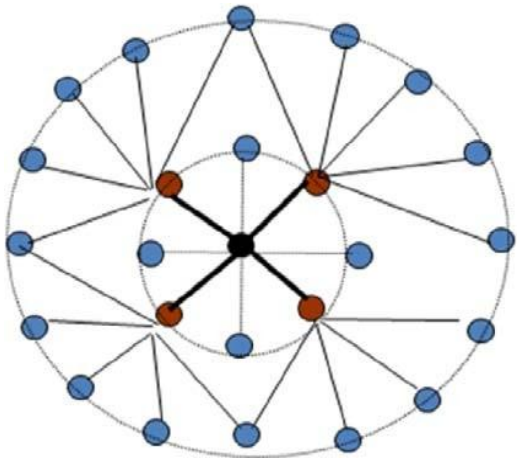

Figure 5: OLSR Multipoint Relay

OLSRv2 is at present being developed inside the IETF. It aintains several of the key skin of the unique includes

MPR selection and distribution. Key difference is the flexibility and modular design using collective components: packet format packet, and neighborhood invention protocol NHDP.
Difference in the managing of several address and interface enable nodes is also there between OLSR andOLSRv2.

Advantages

- OLSR is moreover a flat routing protocol. It does not need central administrative system to handle its routing process.
- The proactive quality of the OLSR protocol that it provides all the routing Information to all participated hosts in the network.
- OLSR protocol does not need that the link is reliable for the control messages, since the messages are sent at regular intervals and the delivery does not have to be in order.
- OLSR increase the protocol suitability for an ad-hoc network with the rapid changes of the source and the destination pairs.

Disadvantages

- However, asadraw back OLSR protocoldesiresthat each host periodic sends the updated topology information throughout the whole network, this raise the protocols bandwidthusage.
- OLSR requires a reasonably large amount of bandwidth and CPU power to compute optimal paths inside the network.
- OLSR requires more processing power than other protocols when discovering an alternate route.

IV. REACTIVE ROUTING PROTOCOLS

Reactive or on-demand routing protocols route is Discover whenneeded.Reactiveprotocolstendtodecreasethecontrol traffic messages overhead at the cost of increased latency in discover a new routes. Source initiated route discovery in reactive routing protocols and less delay. In reactive protocols there is no need of distribution of information. It consumesbandwidthwhentransferdatasourcetodestination. Reactive Protocols are AODV (ad-hoc on demand distance vector), DSR (distance vector routing) and ABR (Associatively Based Routing)protocols.

In this type of routing protocol, each node in a network discovers or maintains a route based on-demand. It floods a control message by global broadcast during discovering a route and when route is discovered then bandwidth is used for data transmission. The main advantage is that this protocol needs less touting information but the disadvantages are that it produces huge control packets due to route discovery during topology changes which occurs frequently in MANETs and it incurs higher latency. The examples of this type of protocol are Dynamic Source Routing (DSR), Ad-hoc On Demand Routing (AODV) and Associatively Based Routing (ABR) protocols.

AODV

AODV stand for Ad-hoc On-Demand Distance Vector Routing .AODV is meaning that it establishes a route to a destination only on demand.AODV is capable of both unicast, broadcast and multicast routing.AODV have some join feature of DSR and AODV.AODV avoids the counting- to-infinity problem of other distance-vector protocols by using sequence numbers on route updates. AODV reacts relatively quickly to the topological changes in the network and updating only the hosts that may be affected by the change, using the RREQ message. Hello messages, be dependable for the route maintenance, are also imperfect so that they do not create unnecessary overhead in the network. TheRREQandRREPmessagesareresponsiblefortheroute discovery.

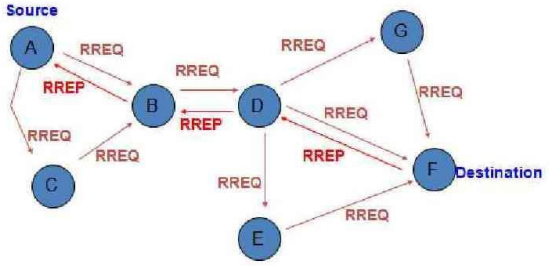

Fig 4: AODV Routing Protocol

Advantages

a) The AODV protocol is basically flat routing protocol so it does not require any inner organizational method to handle the routing process.
b) In AODV routes established on demand and that destination sequence numbers are applied for find the latest route to thedestination.
c) The connection setup delay islower.
d) The AODV protocols are a loop free and avoid the counting to infinityproblem.
e) At most one route per destination maintain at each node.
f) It can lead to heavy controloverhead.

V. CONCLUSION

In the study of proactive and reactive routing protocol, the main feature of Algorithms is less connection delay andloopfreeandInOLSRroutestoeverydestinationinside the network are known and maintain before use.. There is no route discovery delay associated with finding a new route in OLSRframeworktootherroutingprotocols

And each components works independently to give efficient

FUTURE WORKS

In future, the performances evaluation of reactive proactive and hybrid protocols like AODV, OLSR and ZRP under different attacks can be evaluated by using different type of parametersanddifferentsecuritymechanismisdevelopedto preventroutingprotocolsfromthedifferenttypeofattacks

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