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SURVEY ON ROUTING PROTOCOLS IN MANET

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Abstract: Evolution of wireless networking and mobile computing hardware have resulted in wide spread usage of mobile ad hoc networks in many distributed applications. The infrastructure less property and the easy deployment along with the self-organizing nature makes them useful for many applications like military applications and fast response to disasters. Despite it's applicability to multiple applications, the MANET cannot be considered as an alternative to a wired network and it demands a lot of research on security issues. In a MANET, communication can be established among nodes equipped with wireless transceivers without the usage of any routers. In other words, nodes themselves act as routers as well as source and they depend on each other for forwarding packets from a source to a destination. Mobile ad-hoc Network is a self organized spontaneous infrastructure less network which supports networking activities like routing and data transmission. In this paper we will have a detailed study of routing protocols which forwards the data packets from one node to another node in various ways. This paper mainly deals with study of different types of routing protocols and also various types of routing protocols in topology based method.

Keywords: Mobile ad-hoc networks (MANETS), Routing, Topology, Pro-active, Reactive, Hybrid, Position

Introduction:

An ad hoc network is a collection of mobile nodes forming an instant network without fixed topology. In such a network, each node acts as both router and host simultaneously, and can move out or join in the network freely. The instantly created network does not have any base infrastructures as used in the conventional networks, but it is compatible with the conventional networks. In such an environment, it may be necessary for one mobile host to enlist the aid of other hosts in forwarding a packet to its destination, due to the limited range of each mobile host's wireless transmissions. Routing in Mobile Adhoc network is challenging due to the

constraints existing on the transmission bandwidth battery power and CPU time and the requirement to cope with the frequent topological changes resulting from the mobility of the nodes. Nodes of a MANET cooperate in the task of routing packets to destination nodes since each node of the network is able to communicate only with those nodes located within its transmission radius R, while the source and destination nodes can be located at a distance much higher than R. All the nodes in a multi-hop wireless ad hoc network cooperate with each other to form a network without the presence of any infrastructure such as access point or base station the mobile nodes require to forward packets for each other to enable communication among nodes outside the transmission range. The nodes in the network are free to move independently in any direction, leave and join the network arbitrarily. Thus a node experiences changes in its link states regularly with other devices. Eventually, the mobility in the ad hoc network, change of link states and other properties of wireless transmission such as attenuation, multipath propagation, interference etc. create a challenge for routing protocols operating in MANET. The challenges are enhanced by the various types of devices of limited processing power and capabilities that may join in the network.

Different Types of Routing Protocols:

Routing Protocols has been divided into two types. They are:

1. Topology Based Routing Protocols
2. Position Based Routing Protocols

1. **Topology based Routing Protocol:** topology based routing protocol perform packet routing by using the information about the nodes existing in the network. Proactive, reactive and hybrid approaches are examples of topology based routing protocol.
2. **Position based Routing Protocol**: position based routing take away few drawbacks of topology based routing by adding some new information. The routing needs additional information about the physical positioning of each node participating. Position based routing doesn't need any maintenance of routers. The nodes neither keep the routing table up to date by transmitting message nor store the routing table.

Topology based routing protocols are mainly divided into 3categories:
a) Table driven or Proactive protocols
b) On demand or Reactive protocols
c) Hybrid protocol

Proactive protocols: In proactive protocol, each node has to continuously maintain the routing table in the network. The routing information is up to date to preserve the modern view of network. Proactive protocol lowers the amount of traffic overhead because packets are forwarded only to known routers. This is inappropriate for high dynamic networks because routing table are continuously updating with change in topology, this tends in increasing the packet overhead which lower the network performance. Proactive protocol uses the shortest path protocol. Some of the proactive routing protocols are Destination Sequenced Distance Vector (DSDV), Wireless Routing Protocol (WRP), hierarchical source Routing (HSR), Global state Routing (GSR).

Destination Sequenced Distance Vector (DSDV): The proactive DSDV protocol was proposed based upon the Bellman-Ford algorithm to calculate the shortest number of hops to the destination. Each DSDV node maintains a routing table which stores; destinations, next hop addresses and number of hops as well as sequence numbers; routing table updates are sent periodically as incremental dumps limited to a size of 1 packet containing only new information. DSDV compensates for mobility using sequence numbers and routing table updates, if a route update with a higher sequence number is received it will replace the existing route thereby reducing the chance of routing loops, when a major topology change is detected a full routing table dump will be performed, this can add significant overhead to the network in dynamic scenarios.

Wireless Routing Protocol (WRP): This routing protocol defined as the set of distributed shortest path algorithms that calculate the paths using information regarding the length and second-to-last hop of the shortest path to each destination. WRP reduces the number of cases in which a temporary routing loop can occur. For the purpose of routing, each node maintains four things: 1. A distance table 2. A routing table 3. A link-cost table 4. A message retransmission list (MRL). WRP uses periodic update message transmissions to the neighbors of a node. Each time the consistency of the routing information is checked by each node in this protocol, which helps to eliminate routing loops and always tries to find out the best solution for routing in the network

b) **Reactive Routing Protocol:** Reactive protocol builds up routes only when required by source node. The major benefit of this protocol is that it requires minor routing information. When a communication occurs from source to destination, it includes the route discovery process. The route rest justifiable till the destination is attained or the route is no more required or expired. The route discovery happens by flooding the route request packet through the network. When reactive protocol querying for routes there is more network overhead in flooding process. Requires bandwidth only when needed. Some examples of reactive protocol are Ad-hoc On Demand Routing (ADOV), Dynamic Source Routing (DSR), and Location Aided Routing (LAR), temporally ordered Routing Algorithm (TORA).

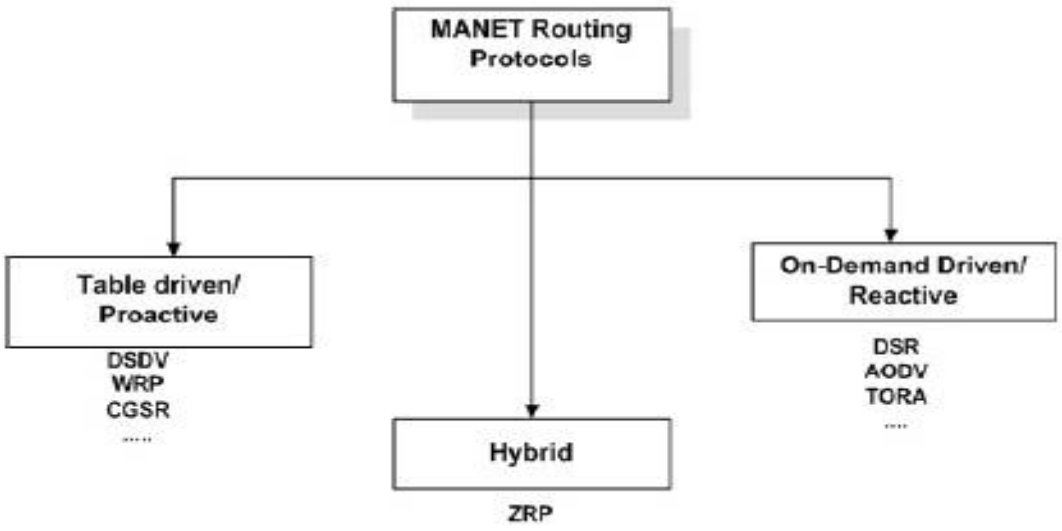
Ad-Hoc on-Demand Distance Vector (AODV): AODV utilizes sequence numbers and routing beacons from DSDV but performs route discovery using on-demand route requests (RREQ); the same process as the DSR protocol. AODV is different to DSR in that it uses distance vector routing; this requires every node in the route to maintain a temporary routing table for the duration of the communication. AODV has improved upon the DSR route request process using an expanding ring search mechanism based upon incrementing time-to-live (TTL) to prevent excessive RREQ flooding. Nodes within an active route record the senders address, sequence numbers and source / destination IP address within their routing tables, this information is used by route reply (RREP) to construct reverse paths. AODV deals with node mobility using sequence numbers to identify and discard outdated routes, this is combined with route error (RERR) messages which are sent when broken links are detected, RERR packets travel upstream to the source informing nodes to delete the broken links and trigger new route discovery if alternative routes are not available

Dynamic Source Routing (DSR): The DSR protocol is broken into two stages; route discovery phase and route maintenance phase, these phases are triggered on demand when a packet needs routing. Route discovery phase floods the network with route requests if a suitable

route is not available in the route. DSR uses a source routing strategy to generate a complete route to the destination, this will then be stored temporarily in nodes route cache. DSR addresses mobility issues through the use of packet acknowledgements; failure to receive an acknowledgement causes packets to be buffered and route error messages to be sent to all upstream nodes. Route error messages trigger the route maintenance phase which removes incorrect routes from the route cache and undertakes a new route discovery phase.

C) **Hybrid Routing Protocol:** The Hybrid protocol is the combination of both proactive routing protocol and reactive routing protocol. They have higher latency than proactive routing protocols. Some examples of Hybrid routing are Zone Routing Protocol (ZRP), Zone Based Hierarchical Link State (ZHLS). ZRP divide the network into zones. The Reactive routing is used to route the packet b/w various zones. Hybrid routing is an appropriate way for routing in large networks. Figure 1 shows the classification of Routing protocols in MANET

Zone Routing Protocol (ZRP): Zone routing protocol is a hybrid routing protocol which effectively combines the best features of proactive and reactive routing protocol. Each node defines a zone around itself and the zone radius is the number of hops to the perimeter of the zone. The reactive global search is done efficiently by querying only a selected set of nodes in the network. The number of nodes queried is in the order of [r zone / r network] of the number of nodes queried using a network-wide flooding process. Unless the zone radius is carefully chosen, a node can be in multiple zones and zones overlap.



Conclusion: This paper discusses on MANET and its characteristics and various types of routing protocols for efficient and effective communication between the mobile nodes participating in a dynamically established network of nodes. The routing protocols are broadly classified into pro-active, reactive and hybrid routing Protocols. In this paper, a brief description on all types of protocols is provided and how they are better than other routing protocols is shown.

References:

[1] Ashwani Kush ; Phalguni Gupta ; Ram Kumar ; :Performance Comparison of Wireless Routing Protocols, Journal of the CSI, Vol. 35 No.2, April-June 2005
[2] AnneAaron; JieWeng; :Performance Comparison of Ad-hoc Routing Protocols for Networks with Node Energy Constraints , available at http://ivms.stanford.edu
[3] Charles Perkins; Elizabeth Royer; Samir Das; Mahesh Marina;: Performance of two on-demand Routing Protocols for AdhocNetworks, IEEE Personal Communications, February 2001, pp. 16-28.
[4] Perkins, C.; Royer, E.B.; Das, .S; :Ad hoc On-Demand Distance Vector (AODV) Routing - Internet Draft", RFC 3561, IETF Network Working Group, July 2003.
[5] Perkins, C.E.; Royer, E.M.; :Ad-Hoc On Demand Distance Vector Routing , Proceedings of the 2nd IEEE Workshop on Mobile Computing Systems and Applications (WMCSA), New Orleans, LA, 1999, pp. 90-100.
[6] Perkins, C.E.; Bhagwat, P.; : Highly dynamic destination-sequenced distance vector routing (DSDV) for mobile computers, Proceedings of ACM SIGCOMM 94, 1994, pp. 34–244.
[7] Bertsekas, D.; Gallager, R.; : Data Networks, Prentice Hall Publ., New Jersey, 2002.
[8] Johnson, D.B; Maltz, D.A; Hu, Y.C.; : The Dynamic Source Routing Protocol for Mobile Ad Hoc Networks (DSR), IETF Draft,
April 2003, work in progress. http://www.ietf.org/internet-drafts/draft-ietf-manet-dsr-09.txt
[9] David Oliver Jorg; :Performance Comparison Of MANET Routing Protocols In Different Network Sizes ,Computer Science Project .
[10] Maltz, D. A; : On-Demand Routing in Multi-hop Wireless Mobile Ad Hoc Networks', May 2001, available at www.monarch.cs.rice.edu
[11] Rover, E.M; Toh, C.K; : A review of current routing protocols for ad hoc networks , IEEE Communications, vol 6, 1999, pp 46-55.
[12] Bertocchi, F.; Bergamo, P.; Mazzin, G.; :Performance Comparison of Routing Protocols for Ad hoc Networks, IEEE GLOBECOM 2003.

