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"Review on Reducing Routing Overhead and Energy Drainage in MANET"

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Abstract: Mobile Ad hoc network is a network where nodes communicate with each other without any network structure as well as central administration. They are interconnected through wireless mediums and can utilize multiple hops to alter information with them. Routing protocols are needed for communication and synchronization in Ad hoc networks, where it targets effective as well timely delivery of message. Routing techniques help in path creation for transmission. The existing routing protocols suffer from overhead inflicting energy loss which may be further annoying by link failures. In this paper we provide an overview of a vast range of the existing routing protocols which mainly focus on their basic characteristics and functionality. Also, the comparison is been presented which supports routing methodologies and information which further used to make routing decisions.

Keywords: MANET, Routing protocols, Routing overhead.

I. INTRODUCTION

Conventional wireless networks are having access point based on infrastructure, to handle the communication among various nodes. This type of network is called as single hop network. A MANET is a self systematized network of mobile nodes which are connected by wireless links and does not requires any fixed infrastructure for communication. The nodes can move independently and in inconsistent manner. A MANET is a self systematized network of mobile nodes connected by wireless links and requires no infrastructure for communication [1].No base stations are reinforced in MANETs. These nodes can be dynamically self-organized into a topology networks which are not planned and without a fixed infrastructure. One of the major challenges in the MANETs is the design of dynamic routing protocols which are always active with good performance and less overhead

Fig1 Mobile ad hoc network

Applications of MANET: MANETs are helpful in places where ever no communication infrastructure or the infrastructure is broken.

Typical applications are:

1. Military or police exercises.
2. Disaster relief operations.

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3. Mine cite operations.
4. Urgent Business conferences

Advantages of MANET

The following are the advantages of MANET:
1. They provide access to information data and services despite of geographic position.
2. These networks will be established at any place and time.
3. Independence from central network administration. Self-configuring network, nodes also act as routers.
4. Less expensive as compared to wired network.
5. Scalable—accommodates the addition of lot more nodes.
6. Improved flexibility.
7. They're strong because of decentralize administration.

II. ROUTING IN MANETS

A key issue is that the necessity that the Routing Protocol should be able to respond quickly to the topological changes within the network. In these networks, each and every node should be capable of acting as a router. As a result of restricted bandwidth of nodes, the source and destination might need to communicate via intermediate nodes. Major issues in routing are links without symmetry, Routing Overhead, Interference, and Dynamic Topology [3].

The routing protocols in MANETS are basically divided into 3 categories which are : proactive (table driven),(hybrid routing protocols, reactive (demand driven), [4].e.g.Optimized Link State Routing (OLSR), Reactive/On demand, Dynamic source Routing Protocol (DSR), ad hoc On-Demand Distance Vector routing protocol (AODV), Temporally Ordered Routing algorithmic program (TORA) and Hybrid, Zone Routing Protocol (ZRP), Hybrid ad hoc Routing Protocol (HARP) , decide to give solely best effort delivery. Their target is restricted to finding the minimum hops or the shortest methods.[5]

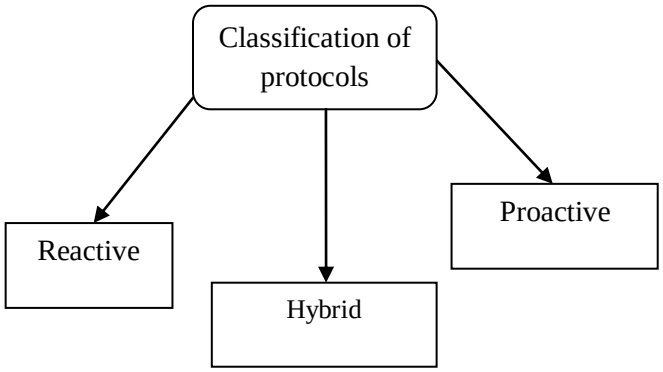

Fig 2: Classification of Routing Protocol

Proactive Routing protocols
The Proactive Routing protocol is additionally referred to as table driven protocol. In Proactive Routing every node updates and maintains its routing protocol whenever the topology changes within the network so it's obscure task to store and maintain entries of every node. Thus this routing isn't applicable for giant networks. [6]

Reactive Routing Protocols
It is additionally known as on demand routing. It is very efficient than proactive routing. The main idea behind this kind of routing is to seek out a route between a source and destination. So in reactive protocols we don't need to worry about the routes which are not being used at that vary time. Discovering the route on demand ignores the cost of maintaining routes that are not being utilized e.g. Ad-hoc On Demand Distance Vector (AODV), Dynamic Source Routing (DSR) and many more.[7]

Hybrid Routing Protocol
Both of the proactive and reactive routing methods have some advantages and disadvantages. It includes the advantages of both the protocols. So these types of protocols can combine the facility of other protocols without even making changes with its own advantages. Examples of hybrid protocols are Zone Routing Protocol (ZRP).[8]

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III ROUTING OVERHEAD

In MANETS repeatedly change in network topology causes link breakage and cancellation of end-to-end route. The routing protocols need to solve the link failure problems and route recovery so that they can adapt to dynamic changes of network topology and as a result to minimize routing overhead. Broadcasting is an effective mechanism for route discovery, but the routing overhead associated with the broadcasting can be quite vast, especially in high dynamic networks. The broadcasting experience results in vast amount of routing overhead may cause many issues like redundant, retransmissions, contentions, as well as collisions.
Thus, optimizing the broadcasting in route discovery is an effective solution to improve the routing performance.[9]

We evaluate the performance of routing protocols using the following performance metric:

Normalized routing overhead: The proportion of the total packet size of control packets (consist of RREQ, RREP, RERR and Hello commands) to the total packet size of data packets delivered to the final destinations. For the control packets which are sent over multiple nodes, each single node is counted as a Transmission.
Packet delivery ratio: The ratio of the number of data packets successfully received by the CBR (Constant bit rate) destinations to the number of data packets generated by the CBR sources.
Average end-to-end delay: The average delay of auspicious delivered CBR packets from source to destination hop. It consists of all possible delays from the CBR sources to all destinations [10].

IV. ENERGY DRAINAGE IN MANET

There are several energy matrices used for calculating the power consumption caused by totally different reasons. The few energy connected metrics are used. These metrics are useful whereas determinant energy efficient routing path rather than considering shortest path within the traditional DSR protocol use. [11]

These metrics are:
1) Energy consumed per packet
2) Time to network partition
3) Variation in node power level
4) Value per packet
5) Maximum node cost

Techniques used for removing routing overhead and energy drainage in MANET:

Rebroadcast technique: Rebroadcast technique is introduced for minimizing routing overhead. On ADDITION the num_neigh field turns positive indicating that the new neighbors ought to be added together with the similar ones. The node id field holds the id's of the neighbor nodes that are to be added immediately. On DELETION the num_neigh field turns negative indicating that the new neighbors ought to be added along with the common ones and therefore node id field holds the id's of the neighbor nodes that are to be deleted alone [12].

Neighbor Coverage based probabilistic rebroadcast (NCPR) protocol technique: The propose technique NCPR is to determine broadcast delay within the rebroadcast order, and obtain the more accurate additional coverage ratio by sensing neighbor coverage information. The main benefits of the neighbor coverage knowledge probabilistic mechanism, is considerably decrease the quality of retransmissions and cut back the routing overhead, additionally improve the routing performance [13].

By using variable transmission power, by using power aware routing protocol and the power management technique: Distributed transmission power management formula to vary the transmission power level that not only will increase the life time of the devices however additionally will increases the packet delivery ratio using appropriate algorithm program not only enhances the life time of the network it makes the communication more practical in terms of output, PDR and delay [14].

Using NCRP Protocol with Cluster Technique: NCPR protocol used to notice Uncovered Nodes in network. The main drawback in NCPR is that, nodes get RREQ again and again. Our proposal provides infrastructure of cluster with NCPR protocol that builds a stable cluster in NCPR which will cut back communication & routing overhead as a result of its distributed & reactive nature. The technique which is introduced shows that the algorithm program who builds stable clusters with low communication overhead because of its localized, distributed and reactive nature. Which will

neither only reduces the routing over head, it will additionally decrease End-to-End delay and increase Packet Delivery ratio with the improvement efficiency [15].

V. COMPARISON OF ROUTING STRATEGIES AND PROTOCOLS

Table1: Parametric comparison of Routing Protocol Strategies

PARAMETERS	REACTIVE PROTOCOL	PROACTIVE PROTOCOL	HYBRID PROTOCOL
Routing Philosophy	FLAT	FLAT/HEIRARCHY	FLAT/HEIRARCHY
Routing scheme	On demand	Table driven	Combination of both
Topology Dissemination	Periodical	On demand	Both
Route latency	Always available	Available when needed	Both
Communication overhead	High	Low	Medium
Scalability	Suitable for small networks	Low	Designed for small networks
Storage capacity	Low	High	Depend upon zone , as capacity inside zone is high
Types	AODV, DSR, TORA	DSDV, WRP, FSR	ZRP, WARP

VI. CONCLUSION

This paper represents the taxonomy of routing protocols in mobile ad hoc networks and provided comparisons among them. The protocols are divided into three important categories: (a) source-initiated (reactive or on-demand), (b) table-driven (pro-active), (c) hybrid protocols. The overall conclusion is that, the performance demand and also the network size plays a vital role in choosing the protocol to be implemented. It's quite natural that one specific solution cannot be implemented for all types of situations and, even though if applied, might not be best in all cases. Basically it is more acceptable to apply a hybrid protocol instead of a strictly proactive or reactive protocol as hybrid protocols mostly possess the advantages of both types of protocols. The performance of hybrid is suitable however best results are shown by OLSR. So, for large type of networks it is efficient to implement OLSR, and for small size networks hybrid protocols are mostly better to implement.

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