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Routing Protocol for Efficient and Secure Data Transmission in Cloud Environment

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Abstract: Olden days mobile phones are evolved into modern powerful Smartphone's to support many applications and these Smartphone's are coming with built in smarter features to support multiple tasks. The mobile battery limitation is major problem in Smartphone's and this problem is overcome by offloading mobile computing and storing data in cloud to preserve the battery. The security is in cloud environment is challenging against the adversaries to secure critical data. The protocols for communication in cloud environment are major issue. There is need off standard communication protocol for secure transmission of data. In this paper we delve into numerous routing protocols to solve this problem. Preserving the user's critical data is important aspect of modern trending cloud storage challenge. The present exploration concentrates on implementing GPSR protocol.

Keywords: MANET, clone, GPSR, mobile cloud environment, routing zone.

I. INTRODUCTION

Cloud computing and mobile computing are broadly endorsed trending technologies to offer many services to its users, with increase in demands for cloud storage from every sector of information technologies. The threat of preserving the data which are transmitted in cloud environment is challenging. Expose of user's data over a cellular network and cloud environment, the care has to be taken to protect the important and critical data from the adversaries [1]. By offloading mobile computation in cloud, the cloud provider must provide the self organizing network to efficiently transmit the data packets by doing it anonymously. Many attackers eavesdropping the transmitting data can cause big threat to data integrity and confidentiality. For preserving security aspect of data in cloud environment. The care has to be taken to ensure data integrity by anonymously sending data in mobile ad hoc network within cloud environment.

In modern cryptography, encryption keys obtained are of two categories, symmetric and asymmetric (public) key. The public key encryption tends to be much more secured as it involves combination of two different keys, public and private key respectively. This gives more flexibility for various applications.

Routing algorithms are categorized into table driven (proactive) routing, on demand (reactive) routing, hybrid routing and hierarchical routing protocol. The geo-routing protocol lean to furnish efficient and secure routing transmission

A. Need for GPSR protocol

Greedy perimeter stateless routing protocol for wireless network uses the location of routers and destination nodes to transmit data from source node to destination node in mobile ad-hoc network within cloud environment. With increasing number of mobile nodes and considering the scenario of fluctuating mobile nodes, where a sender S sending data packet to receiver R. where this transmission path is chosen based on the immediate neighbors from sender to receiver by using greedy perimeter stateless routing protocol [2] which in turn uses local topology information to overcome path failures efficiently.

In this paper, we will discuss the various routing protocols.

II. LITERATURE SURVEY

1. Proactive Routing protocols

Table driven routing protocols are also known as proactive routing protocols. In this protocols network topology information is kept in routing table regardless of any use of it [3]. Sometimes this information is useful for datagram traffic. The routing tables need to be updated periodically whenever there is fluctuation in network topologies. This is difficult for any large network where different protocols need to maintain many number of routing tables. DSDV, WRP, OLSR are few examples for proactive routing protocols.

1.1 Dynamic destination-sequenced distance-vector routing protocol (DSDV)

Bellman ford algorithm [5] modified slightly to develop DSDV protocol [4]. DSDV routing protocol keeps routing table for each mobile node in the network. Routing table consists of topology information such as all available destination nodes and the number of hops for each node. Each routing table contains sequence number which is evolved from destination node. Updating routing information helps maintaining routing information of topologies. This updating might be either event driven or periodic. This is done by advertisement which may be done by broadcasting or multicasting periodically. DSDV protocol fails to work efficiently for fluctuating topologies.

1.2 Wireless routing protocol (WRP)

Wireless routing protocol [5] is path finding algorithm [4], it calculates the paths considering the information

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mentioned by nodes. Every node keeps four things for the purpose of routing which are a distance table, link cost table, routing table and message retransmission list (MRL). The wireless routing protocol uses the updates to transmit messages. MRL should acknowledge to response list. If there is no alteration of last update, then response list node should send an idle message to ensure its connectivity. A node itself can monitor whether to update its routing information after receiving updates from next neighbour node and it will always choose better path using new updates

1.3 Cluster gateway switch routing protocol (CGSR)
Cluster gateway switch routing [6] protocol (CGSR) operates by considering a clustered mobile wireless network. By developing several clusters distributed processing mechanism is achieved however it is difficult to implement when there is frequent change or selection of cluster heads.

2. Reactive Routing Protocols
Reactive Protocol has lower overhead as routers are set on demand. It utilizes flooding idea. Continually updating of tables information with the most recent route topology is not needed in on demand idea. Reactive protocol searches for paths in an on-demand way and set the connection keeping in mind the end destination node to receive packet from a source node. This procedure utilizes route discovery process by flooding the route request (RREQ) over the network. Dynamic source Routing (DSR), ad hoc on demand distance vector routing (AODV) are few examples for reactive routing protocols.

2.1 Dynamic source routing protocol (DSR)
Dynamic source routing protocol (DSR) [7] is a simple reactive routing protocol skilled to utilize multi-hop mobile ad hoc network. Completely SON and self-configuring network enabled by use of dynamic source routing protocol without any base infrastructure. Route discovery and route maintenance are the two steps carried out in this protocol.
First mechanism route discovery by which a source node willing to send a packet to a destination node. Route Discovery is used only when source attempts to send a packet to destination and does not already know a route to Destination. Second route Maintenance is the mechanism by which source node is able to detect, while using a source route to destination node, if the network topology has changed such that it can no longer use its route to destination because a link along the route no longer works. When Route Maintenance indicates a source route is broken, source can attempt to use any other route it happens to know to destination, or can invoke route discovery again to find a new route. Route Maintenance is used only when source is actually sending packets to destination.
Without a successful system to uproot unreasonably old (stale) entries, caches of route may include broken or non-least hop routes. Utilizing stale routes causes loss of information (low delivery rate) and waste transmission capacity by bandwidth. Route answers from intermediate nodes and snooping packets. Intermediate replies from the nodes can hurt the dynamic source routing such that it is difficult to efficiently implement this protocol.

2.2 The Ad hoc On Demand Distance Vector (AODV)
The Ad hoc On Demand Distance Vector (AODV) is reactive routing protocol developed for mobile ad hoc networks. AODV [8] is fit for both uni-cast and multicast routing. It is an on demand protocol such that it establishes routes between source and destination if required by source node. It utilizes these routes until these routes are required by source node. In addition to this AODV form trees to connect multicast group members. Trees include nodes required to connect all the group members. Sequence numbering is assigned to ensure updating routes.
The routes built in an AODV protocol using route/request reply queries. When a source node requires a route to the destination node which does not exist earlier, it sends a route request packet (RREQ) to all the nodes in the network. Whenever the nodes receive this query they update this information in the source node and set the pointers for the source nodes in the routing tables. Apart from source node's IP address, sequence number, and the broadcast ID, the RREQ also contains the recent sequence number for the destination in which the source node is alert. Whenever a node receives a RREQ request it sends a RREP (route reply) to the source node, if it's an intermediate node containing route to the destination node or a destination node in which the sequence number is greater than or equal to the sequence number in the RREQ. In this case it unicast a RREP to the source, or else it broadcasts RREQ to all the other nodes. The nodes keep track of the source IP address and the destination ID of the RREQ, if they have processed the query, and then they will discard the query and does not forward it.
AODV has a higher processing demand, it consumes more share of bandwidth and AODV takes more time to build routing table which make us to look at other protocols.

2.3 Associativity-Based Routing (ABR)
ABR [9] protocol characterizes another kind of routing parameter "degree of association stability" for ad hoc network. In this routing convention, a route is chosen taking into account the degree of association stability of MANET nodes. Every node occasionally produces signal to declare its presence. After getting the signal message, a neighbour route refreshes its own routing table. For every beacon each nodes are marked such that they are static and other nodes are reset when they travel out of neighbouring range. This property of degree of association stability is difficult during when there is large network.

3. Hybrid routing protocol
There are major drawbacks in proactive routing protocols and reactive protocols. Proactive possesses large overhead and less latency was as reactive protocols have large latency and less overhead. To overcome these drawbacks hybrid routing protocol is designed by combining both routing protocols. Hybrid routing protocol is applicable for

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large networks. Zones are created by dividing large networks, routing inside and outside is performed by using proactive and reactive respectively. ZPR, SHARP are the popular examples of hybrid protocols.

TABLE I
COMPARISONS BETWEEN ROUTING PROTOCOL OVERHEAD

Methods	Routing overhead	Pkt processing overhead
DSDV	High	Low
WRP	High	Low
Cluster	High	Low
DSR	Low	High
ABR	Low	Low

3.1 Zone Routing Protocol (ZRP)
Different types of MANETs use Zone routing protocol [10], especially for huge network and fluctuating network with greater mobility patterns. Every node in the network actively maintains routes within local range, which is defined as routing zone. Route creation is enabled using a query-reply mechanism. Zone creating in the network follows; a node first has to know who its neighbours are. Direct communication can be established with neighbour, within transmission range of a node. Intra-zone routing protocol (IARP) [11] is base for neighbour discovery information. Zone routing protocol is difficult with large networks and in realistic scenario.

3.2 Sharp Hybrid Adaptive Routing Protocol (SHARP)
Sharp Hybrid Adaptive Routing Protocol (SHARP) [12], which naturally discovers the offset point in the middle of proactive and reactive routing by changing the extent to which route information is spread proactively versus the degree to which it needs to be found reactively. SHARP empowers every node to utilize an alternate application-specific performance metric to control the adjustment of the routing layer. Application-particular conventions based on top of SHARP for minimizing packet overhead, loss rate, and controlling jitter. As the performance will depend on the selected proactive and reactive protocol so it is quite difficult to choose right protocols each time.

Proposed Solution
Mobile ad-hoc network (MANET) is created using mobile network in the cloud environment these are connected to respective mobile devices. Computational offloading are done at cloud environment and packet transmission are done by marking sender or source X and destination as Y as shown in figure 1.
These nodes are provided with radio signal which will sense the neighboring node distance and forward according to greedy forwarding method until it reaches to desired destination for packets. In figure 1 red colored node X marked as source and blue colored node as destination such that the packet transmission starts from node X, first it senses the neighboring node Y as nearest among all the nodes from destination distance.

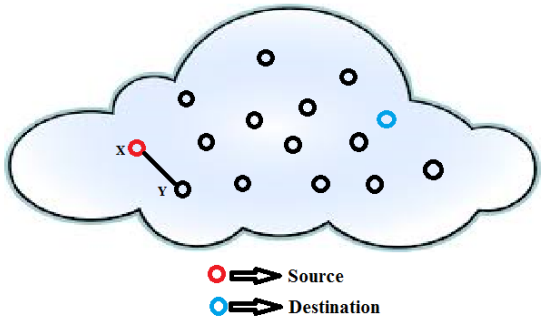

Fig. 1. Greedy Forwarding

Sometimes greedy forwarding fails during the packet forwarding shown in figure 2. Immediately perimeter forwarding start working as it will start rotating around the nodes perimeter to detect alternative path for packet transmission.

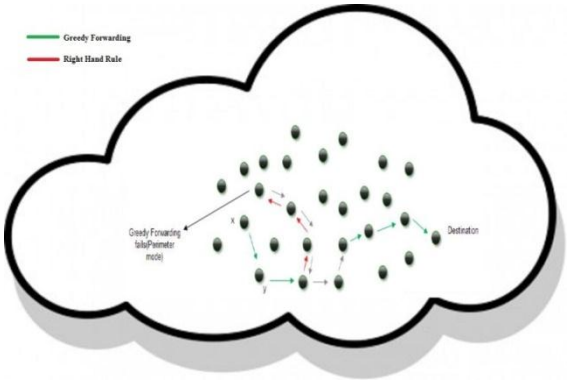

Fig. 2. Greedy perimeter stateless routing protocol

Perimeter forwarding uses right hand thumb rule on the perimeter of nodes to detect the nearest neighbouring node. Figure 2 shows x node is source which forward packet to its neighbouring node y by using greedy forwarding after that greedy fails marking their move with red colors and immediate perimeter forwarding is shown with green color arrows to transmit packet successfully to destination. These mobile nodes are also called as clones in the cloud environment such that they can efficiently route the data packets.
A secure algorithm such as AES is used to encrypt data before it is transmitted for securing critical data against the adversaries or from third party threats.

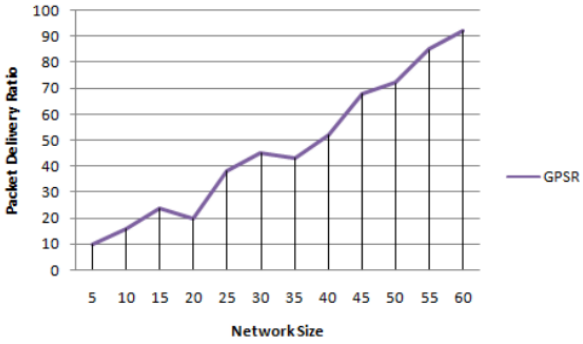

Fig. 3. Packet delivery ratio

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In figure 3 shows packet delivery ratio how packets are delivered for different values of network size successfully. With varying network size GPSR can be used effectively for successful packet delivery regardless of fluctuating network radio nodes.

CONCLUSION

In this paper we discussed number of routing protocols such as DSDV, WRP, CGSR, DSR, AODV, ABR, SSA, TORA, ZPR but with the effect of mobility of nodes and fluctuating nature of wireless network it has been learned that Greedy perimeter stateless routing protocol (GPSR) is best suitable for fluctuating networks. GPSR uses local topology information and immediate neighbour information for making forwarding decisions. It has been learned that how link failure and battery limitations of radio nodes are overcame by using GPSR protocol. Our solution provides use of GPSR protocol in cloud environment is suitable for faster transmission of data. There is plenty of simulation to be carried out in this exiting and promising field.

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