IJCSMS International Journal of Computer Science & Management Studies, Vol. 12, Issue 03, September 2012
ISSN (Online): 2231 –5268
www.ijcsms.com

Analysis of Routing in Mobile Ad-hoc Networks

Shweta[1], Vinit Kumar[2], Anish Mittal[3], Dr. Pankaj Gupta[4], Deepak Goel[5]

[1]Vaish College of Engineering, MDU, Rohtak
shwetauppal96@yahoo.in

[2]Research Scholar
lohanvinit@gmail.com

[3]Asst. Prof., Vaish College of Engineering, MDU, Rohtak
anishmittal123@gmail.com

[4]Prof, Vaish College of Engineering, MDU, Rohtak

[5]Asso. Prof., Vaish College of Engineering, MDU, Rohtak

Abstract

An ad-hoc network is a collection of wireless mobile hosts forming a temporary network without the aid of any stand-alone infrastructure or centralized administration. Routing in Ad hoc networks is a challenging problem because nodes are mobile and links are continuously being created and broken.In this model we not only improves the reputation of the network but also provide a routing approach for reliable data transmission and also avoid the loop occurs in the communication. The mobile network is the dynamic network that provides the solution for the inclusion and exclusion of dynamic nodes in the network. AODV and DSR are the two most popular routing protocols for ad-hoc network that we discussed here. In this paper we describe the way to find the node having packet loss and to perform the elimination of node from the network without performing the rerouting and provide the reliable data transfer over the network. In this paper, we design and evaluate cooperative caching techniques to efficiently support data access in the ad-hoc network.

Keywords: *Ad-hoc, MANET, Cooperative Caching, AODV, Cache data.*

I. INTRODUCTION

Ad-hoc networks are mobile wireless networks that have no fixed infrastructure. There are no fixed routers .Instead each node acts as a router and forwards traffic from other nodes[1]. A number of routing protocols have been suggested for ad-hoc networks .Routing in Ad hoc networks is a challenging problem because of node mobility and the scarcity of the bandwidth. Ad Hoc routing protocols fall into two categories:

(1) Table-driven (proactive)
(2) On-demand (reactive).

Table-driven protocols attempt to maintain consistent, up-to-date routing information among all nodes in the network. Thus, they require periodic route-update messages to propagate throughout the network[3]. On the other hand, On-demand protocols initiate a route request flood whenever there is a path is needed between a pair of nodes. The advantage of the table-driven approach is that routes to any destination are always available without the overhead of a route discovery. In contrast, in On-demand routing, the source must wait until a route has been discovered, but the overhead is significantly less than Table-driven algorithms where many of the updates are for unused paths[2]. A large number of routing protocols have been suggested including proactive , reactive and hybrids protocols.

II. PROBLEMS WITH ROUTING IN MOBILE AD-HOC NET-WORKS

- *Asymmetric links*: Most of the wired networks rely on the symmetric links which are always fixed. But this is not a case with ad-hoc networks as the nodes are mobile and constantly changing their position within network.

- *Routing Overhead*: In wireless ad hoc networks, nodes often change their location within network. So, some stale routes are generated in the routing table which leads to unnecessary routing overhead.

- *Interference*: This is the major problem with mobile ad-hoc networks as links come and go depending on the transmission characteristics, one transmission might interfere with another one and no de might overhear transmissions of other nodes and can corrupt the total transmission.

- *Dynamic Topology:* This is also the major problem with ad-hoc routing since the topology is not constant. The mobile node might move or medium characteristics might change. In ad-hoc networks, routing tables must somehow reject these changes in topology and routing algorithms have to be adapted.

III. CLASSIFICATION OF ROUTING PROTOCOLS IN MANET'S

Classification of routing protocols in MANET's can be done in many ways, but most of these are done depending on routing strategy and network structure. According to the routing strategy the routing protocols can be categorized as Table-driven and source initiated, while depending on the network structure these are classified as at routing, hierarchical routing [10]and geographic position assisted routing. Both the Table-driven and source initiated protocols come under the Flat routing [10][5][3].

A. Table-Driven routing protocols (Proactive)

These protocols are also called as proactive protocols since they maintain the routing information even before it is needed[5]. Each and every node in the network maintains routing information to every other node in the network. Routes information is generally kept in the routing tables and is periodically updated as the network topology changes. Many of these routing protocols come from the link-state routing. Furthermore, these routing protocols maintain different number of tables. The proactive protocols are not suitable for larger networks, as they need to maintain node entries for each and every node in the routing table of every node[3]. This causes more overhead in the routing table leading to consumption of more bandwidth.

B. On Demand routing protocols (Reactive)

These protocols[1] are also called reactive protocols since they don't maintain routing information or routing activity at the network nodes if there is no communication. If a node wants to send a packet to another node then this proto col searches for the route in an on-demand manner and establishes the connection in order to transmit and receive the packet[13]. The route discovery usually occurs by flooding the route request packets throughout the network.

C. Destination Sequenced Distance Vector (DSDV) Protocol

The destination sequenced distance vector routing protocol is a proactive routing protocol which is a modification of conventional Bellman-Ford routing algorithm. This protocol adds a new attribute, sequence number, to each route table entry at each node. Routing table is maintained at each node and with this table; node transmits the packets to other nodes in the network. This protocol was motivated for the use of data exchange along changing and arbitrary paths of interconnection which may not be close to any base station.

D. AODV (Ad-hoc On Demand Distance Vector Protocol)

It is another type of routing algorithm used in the ad-hoc networks .It is exactly similar to DSR protocol but the difference between the DSR from AODV and other on-demand protocol is the use of source routing ,where the source node specifies the complete sequence of intermediate nodes for each data packet to reach its destination. In AODV we don’t use the concept of source routing .In AODV protocol each node maintains a table known as routing table in which we have to store the destination and next hop IP address as well as destination sequence number.

E. DSR (Dynamic Source Routing Protocol)

DSR is one of the most popular and well-known routing algorithm for ad-hoc wireless networks .In DSR protocol we used the concept of source-routing where the source node specifies the complete sequence of intermediate nodes for each data packet to reach its destination .The communication between nodes exist by forwarding data packets from one node to another by using multiple hops .The DSR protocol allow nodes to dynamically discover a source node across multiple network hops to any destination in the ad-hoc network .The use of source routing allows packet routing to be trivially loop-free, avoids the need for up-to-date routing information in the intermediate nodes through which packets are forwarded and allows nodes forwarding or overhearing packets to cache the routing information in them.

The advantage of source routing is that no additional mechanism is required to detect routing loops. But also it has disadvantage that data packets has over-head to carry source routes. The data structure that DSR uses to store routing information is route cache with each cache entry storing one specific route from the source to destination.

DSR Protocol Overview

Source routing is a routing technique in which the sender of a packet determines the complete sequence of nodes through which to forward the packet[9]. DSR is broken down into three functional components: routing, route discovery and route maintenance. Routing has already been described and is relatively trivial. Route discovery and Route maintenance are discuss here.

1. Route Discovery

To perform route discovery, the source node broadcasts a route request packet with a recorded source route listing only itself. Each node that hears the route request forwards the request (if appropriate), adding its own address to the recorded source route in the packet. The route request packet propagates hop-by-hop outward from the source node until either the destination node is found or until another node is found that can supply a route to the target.

2. Route Maintenance

If the status of a link or node changes, the periodic updates will eventually reflect the change to all other nodes, presumably resulting in the computation of new routes. However, using route discovery, there are no periodic messages of any kind from any of the mobile nodes[7]. Instead, while a route is in use, the route maintenance procedure monitors the operation of the route and informs the sender of any routing errors. Route maintenance can also be performed using end-to-end acknowledgments rather than the hop-by-hop acknowledgments described above.

IV. RESEARCH METHODOLOGY

We propose proactively disseminating the broken link information to the nodes that have that link in their caches. We define a new cache structure called a cache table and present distributed cache update algorithm. Each node maintains in its cache table the information necessary for cache updates. When a link failure is detected, the algorithm notifies all reachable nodes that have cached the link in a distributed manner. The above problem can be solved through

1. Dynamic Source Routing protocol (DSR)
2. Explicit Link Failure Notification (ELFN)

1. Dynamic Source Routing protocol (DSR)

A. Route Discovery

- The source broadcasts a ROUTE REQUEST.
- If the node has a route to the source, it sends a ROUTE REPLY to the source, including the source route in the ROUTE REQUEST and the cached route.
- If the node has no such a route, it adds its address to the source route in the packet header and rebroadcasts the ROUTE REQUEST.
- 4 .The destinations receive the ROUTE REQUEST, and send a ROUTE REPLY containing the route to the source.
- Each node forwarding the ROUTE REPLY caches the route starting from itself to the destination.
- The source receives the ROUTE REPLY, and caches the source route.

B. Route Maintenance

- A node forwarding a packet is responsible for confirming that the packet has reached the next hop in the route.
- If no acknowledgement is received after the maximum number of retransmission attempts, this node assumes that the next hop is unreachable and sends a ROUTE ERROR to the source node, indicating the broken link.
- Each node receiving a ROUTE ERROR removes from its cache the routes containing the broken link.

2. Explicit Link Failure Notification (ELFN)

- When a node detects a link failure, it will notify the TCP sender about the link failure and the packet that encountered the failure.
- When receiving a notification, TCP freezes its retransmission timer and periodically sends a probing packet until it receives an ACK.

- When receiving an ACK, TCP restores its retransmission timer and continues as normal.
- TCP benefits from link failure feedbacks but is still affected by frequent route failures due to the inability of a TCP sender's routing protocol to quickly recognize and remove stale routes from its cache.
- Previous research proposed to turn off replying from caches for a network with a single TCP connection. But it will degrade TCP performance when multiple traffic sources exist because of increased routing overhead**.**

V. RELATED WORKS

CACHING

The paper further proposes caching as a technique for reducing control traffic. Caching techniques are an efficient solution for increasing he performance in message or data communication.[4]The original idea of caching is that the data accessed by MHs has the property of temporal and spatial locality. A cooperative cache-based data access scheme is proposed for ad-hoc networks.

A. Cache data

In cache Data, the intermediate hosts, which are located along the between the source host and the destination host, cache frequently accessed data items[5]. In cache data, the router node caches the data instead of the path when it finds that the data is frequently accessed

.

B. Cache Path

In Cache path, the intermediate hosts record the routing path when information of passing data. Cache Path records only the data path when it is closer to the caching host than the data source[4][5]. To handle cache consistency, Cache Path and Cache Data is used.

VI. CONCLUSION

We will provide the solution of rerouting in case of broken link problem in mobile area network. As the broken link found that will be discarded from the network. As we know the mobile network is the dynamic network that provide the solution for the inclusion and exclusion of dynamic nodes in the network. We are proposing the way to find the node having packet loss and to perform the elimination of node from network without performing the rerouting. The proposed work will provide the solution of the above problem as well provide the reliable data transfer over the network. We used two optimizations for our algorithm. First, to reduce duplicate notifications to a node, we attach a reference list to each notification. The node detecting a link failure is the root, initializing the list to be its notification list. Each child notifies only the nodes not in the list and updates the list by adding the nodes in its notification list. Second, we piggyback a notification on the data packet that encounters a broken link if that packet can be salvaged. When using the algorithm, we also use a small list of broken links, which is similar to the negative cache proposed in prior work, to prevent a node from being re-polluted by in-flight stale routes.

References

[1] Johnson D.B. and Maltz D.A., Broch J.,(1996), "The Dynamic Source Routing Protocol for Multi-Hop Wireless Ad-hoc Networks," Mobile Computing, pp 153-186.

[2] Yin L. and Cao G.," Supporting Cooperative Caching in Ad Hoc Networks," Deptt of C.S.E, The Pennsylvania State University, University Park, 16802.

[3]He Y. and Berson S.,(2010), "Active Packets Improve Dynamic Source Routing for AD Hoc Networks," Deptt of Computer Science University of Southern California, Information Sciences Institute University of Southern California.

[4]Shanmugavadivu K. and Madheswaran M.,(2009),**"**Caching Technique for Improving Data Retrieval Performance in Mobile Ad Hoc Networks**,"**K.S. Rangasamy College of Technology/Tiruchengode-637215.

[5] K.R.S. and Rajanikanth K.,(2009)**, "**Intelligent Caching in on-demand Routing Protocol for Mobile Ad Hoc Networks**," .**

[6]Rawat A., et al, (2007) **, "**Enhanced DSR for MANET with Improved Secured Route Discovery and QoS," Department of Electronics and Telecommunication Engineering, Shri G. S. Institute of Technology and Science, India School of Computer Science, DAVV, Khandwa Road Campus, India.

[7] Aarthi V. and Siromoney A.,**"**Quality of Service Routing in DSR,**"**School of Computer Science

and Engg, Anna University, Chennai 600 025, India.

[8]Marina M.K.,**"**Performance of Route Caching Strategies in Dynamic Source Routing**,"**Deptt of Electrical & Computer Science & Engg, University of Cincinnati, OH 45221.

[9]Barua G. and Agarwal M**.**, **"**Caching of Routes in Ad hoc On-Demand Distance,**"** Indian Institute of Technology Guwahati, India.

[10]Shah S., et al (2008),"Performance Evaluation of Ad Hoc Routing Protocols**,"** Veermata Jijabai Technological Institute, Mumbai, India .

[11]The Institute of Electrical and Electronics Engineers, Inc. IEEE Std 802.11 – "Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) specifications," 1999 edition**.**

[12] Surayati N., Usop M.,(2009)**, "**Performance Evaluation of AODV, DSDV & DSR Routing Protocol in Grid Environment**".**

[13]Abdelfattah E., Liu G.,(2008)**, "**Performance Evaluation of Mobile Ad-Hoc Routing Protocols**",** T. Sobh et al. (eds.), Novel Algorithms and Techniques in Telecommunications, Automation and Industrial Electronics.