April 2014

Simulation of DSDV Protocol

Neelam Chauhan

Computer Engineering , BRCM Behal, Bhiwani, Bhiwani, India, er.neelam.choudhary@gmail.com

Paramjeet Singh

ECE Department, Govt. Polytechnic, Loharu, Bhiwani, Haryana, India, chauhan.paramjeet@gmail.com

Follow this and additional works at: <https://www.interscience.in/ijcct>

Recommended Citation

Chauhan, Neelam and Singh, Paramjeet (2014) "Simulation of DSDV Protocol," *International Journal of Computer and Communication Technology*. Vol. 5 : Iss. 2 , Article 12.

DOI: 10.47893/IJCCT.2014.1234

Available at: <https://www.interscience.in/ijcct/vol5/iss2/12>

This Article is brought to you for free and open access by the Interscience Journals at Interscience Research Network. It has been accepted for inclusion in International Journal of Computer and Communication Technology by an authorized editor of Interscience Research Network. For more information, please contact sritampatnaik@gmail.com.

Simulation of DSDV Protocol

Neelam Chauhan¹ & Paramjeet Singh²

¹Computer Engineering , BRCM Behal, Bhiwani, India

²ECE Department, Govt. Polytechnic, Loharu, Bhiwani, Haryana, India

E-mail : er.neelam.choudhary@gmail.com¹, chauhan.paramjeet@gmail.com²

Abstract - An ad-hoc network is the cooperative engagement of a collection of Mobile Hosts without the required intervention of any centralized Access Point. This Application is the innovative design for the operation of such ad-hoc networks. The basic idea of the design is to operate each Mobile Host as a specialized router, which periodically advertises its view of the interconnection topology with other Mobile Hosts within the network. This amounts to a new sort of routing protocol. This paper is practically applied using the specifications that are defined through Highly Dynamic Destination Sequenced Distance Vector Routing Algorithm.

Key words - *ad-hoc network ,Routing Destination Sequenced Distance Vector Routing, Use case , Routing Table.*

I. INTRODUCTION

The wireless communications systems in the mobile computers support a broadcast mechanism, much more flexible and useful ways of sharing information can be imagined. For instance, any number of people could conceivably enter a conference room and agree to support communications links between themselves, without necessarily engaging the services of any preexisting equipment in the room (i.e, without requiring any preexisting communications infrastructure). Thus, one of our primary motivations is to allow the construction of temporary networks with no wires and no administrative intervention required. Such a interconnection between the mobile computers will be called an ad-hoc network, in conformance with current usage within the IEEE 802.11 subcommittee]. The same nature can be applied to other mobile computing devices like mobile phones.

Ad-hoc networks differ significantly from existing networks. First of all the topology of interconnections may be quite dynamic. Secondly, most users will not wish to perform any administrative actions to set up such a network. In order to provide service in the most general situation, we do not assume that every computer is within communication range of every other computer. This lack of complete connectivity would certainly be a reasonable characteristic of, say, a population of mobile computers in a large room which relied on infrared transceivers to effect their data communications.

Routing protocols for existing networks have not been designed specifically to provide the kind of

dynamic, self-starting behavior needed for ad-hoc networks. Most protocols exhibit their least desirable behavior when presented with a highly dynamic interconnection topology. Although we thought that mobile computers could naturally be modeled as routers. It was also clear that existing routing protocols would place too heavy a computational burden on each mobile computer. Moreover the convergence characteristics of existing routing protocols did not seem good enough to meet the needs of ad-hoc networks. Lastly, the wireless medium differs in important ways from wired media, which would require that we make modifications to whichever routing protocol we might choose to experiment with. For instance mobile computers may well have only a single network interface adapter, whereas most existing routers have network interfaces to connect two separate networks together. Besides, wireless media are of limited and variable range, in distinction to existing wired media. Since we had to make lots of changes anyway, we decided to follow our ad-hoc network model as far as we could and ended up with a substantially new approach to the classic distance vector routing.

II. 11 BACKGROUND KNOWLEDGE

A. Overview of routing method

In our environment, the problem of routing is essentially the distributed version of the shortest path problem . Each node in the network maintains for each destination a preferred neighbor. Each data packet contains a destination node identifier in its header.

When a node receives a data packet, it forwards the packet to the preferred neighbor for its destination. The forwarding process continues until the packet reaches its destination. The manner in which routing tables are constructed maintained and updated differs from one routing method to another. Popular routing methods however, attempt to achieve the common objective of routing packets along the optimal path. The next-hop routing methods can be categorized into two primary classes link-state and distance-vector.

B. Link-State

The link-state approach is closer to the centralized version of the shortest path computation method. Each node maintains a view of the network topology with a cost for each link. To keep these views consistent each node periodically broadcasts the link costs of its outgoing links to all other nodes using a protocol such as flooding. As a node receives this information, it updates its view of the network topology and applies a shortest-path algorithm to choose its next hop for each destination. Some of the link costs in a node's view can be incorrect because of long propagation delays, partitioned network, etc.,. Such inconsistent views of network topologies might lead to formation of routing loops. These loops, however, are short-lived, because they disappear in the time it takes a message to traverse the diameter of the network.

C. Distance vector

In distance-vector algorithms, every node i maintains, for each destination x , a set of distances $\{dx_{ij}\}$ where j ranges over the neighbors of i . Node i treats neighbor k as a next-hop for a packet destined for x if $\{dx_{ik}\}$ equals $\min_j \{dx_{ij}\}$. The succession of next hops chosen in this manner lead to x along the shortest path. In order to keep the distance estimates up-to-date, each node monitors the cost of its outgoing links and periodically broadcasts, to each one its neighbors, its current estimate of the shortest distance to every other node in the network.

D. Destination-Sequenced Distance Vector (DSDV) Protocol

Our proposed routing method allows a collection of mobile computers, which may not be close to any base station and can exchange data along changing and arbitrary paths of interconnection, to afford all computers among their number a (possibly multi-hop) path along which data can be exchanged. In addition, our solution must remain compatible with operation in cases where a base station is available. By the methods outlined in this paper not only will routing be seen to solve the problems associated with ad-hoc networks, but in addition we will describe ways to perform such

routing functions at Layer 2, which traditionally has not been utilized as a protocol level for routing.

Packets are transmitted between the stations of the network by using routing tables which are stored at each station of the network. Each routing table, at each of the stations, lists all available destinations, and the number of hops to each. Each route table entry is tagged with a sequence number which is originated by the destination station. To maintain the consistency of routing tables in a dynamically varying topology, each station periodically transmits updates, and transmits updates immediately when significant new information is available. Since we do not assume that the mobile hosts are maintaining any sort of time synchronization, we also make no assumption about the phase relationship of the update periods between the mobile hosts. These packets indicate which stations are accessible from each station and the number of hops necessary to reach these accessible stations, as is often done in distance-vector routing algorithms. It is not the purpose of this paper to propose any new metrics for route selection other than the freshness of the sequence numbers associated with the route; cost or other metrics might easily replace the number of hops in other implementations. The packets may be transmitted containing either layer 2 (MAC) addresses or layer 3 (network) addresses.

Routing information is advertised by broadcasting or multicasting the packets which are transmitted periodically and incrementally as topological changes are detected - for instance, when stations move within the network. Data is also kept about the length of time between arrival of the first and the arrival of the best route for each particular destination. Based on this data, a decision may be made to delay advertising routes which are about to change soon, thus damping fluctuations of the route tables. The advertisement of routes which may not have stabilized yet is delayed in order to reduce the number of rebroadcasts of possible route entries that normally arrive with the same sequence number.

The DSDV protocol requires each mobile station to advertise, to each of its current neighbors, its own routing table (for instance, by broadcasting its entries). The entries in this list may change fairly dynamically over time, so the advertisement must be made often enough to ensure that every mobile computer can almost always locate every other mobile computer of the collection. In addition, each mobile computer agrees to relay data packets to other computers upon request. This agreement places a premium on the ability to determine the shortest number of hops for a route to a destination we would like to avoid unnecessarily disturbing mobile hosts if they are in sleep mode. In this way a mobile computer may exchange data with any other mobile

computer in the group even if the target of the data is not within range for direct communication. If the notification of which other mobile computers are accessible from any particular computer in the collection is done at layer 2, then DSDV will work with whatever higher layer (e.g., Network Layer) protocol might be in use.

All the computers interoperating to create data paths between themselves broadcast the necessary data periodically, say once every few seconds. In a wireless medium, it is important to keep in mind that broadcasts are limited in range by the physical characteristics of the medium. This is different than the situation with wired media, which usually have a much more well defined range of reception. The data broadcast by each mobile computer will contain its new sequence number and the following information for each new route:

- The destination's address;
- The number of hops required to reach the destination; and
- The sequence number of the information received regarding that destination, as originally stamped by the destination;

This total paper is practically applied using the specifications that are defined through Highly Dynamic Destination Sequenced Distance Vector Routing Algorithm.

E. Example of DSDV in operation

Fig. 1

TABLE I. THE ROUTING TABLE FOR THE ABOVE POSITION OF NODES

Destination	Next Hop	Metric	Seq. No
MH4	MH4	0	S406_MH4
MH1	MH2	2	S128_MH1
MH2	MH2	1	S564_MH2
MH3	MH2	2	S710_MH3

MH5	MH6	2	S392_MH5
MH6	MH6	1	S076_MH6
MH7	MH6	2	S128_MH7
MH8	MH6	3	S050_MH8

III. 111 SYSTEM ANALYSIS AND DESIGN

A. System Analysis

People for long time have tried to sort out the problems faced in the general network communication system. But as the problem of providing communications in ad-hoc networks exist even now, a new theory has evolved to enable this with the help of proposed theory called DSDV Protocol. The advantages of this System are:

- No requirement of centralized administrative task.
- Time effective transfer of message. In this fast growing world where every individual requires access to the information on the network and more over most of them equipped with latest technology the necessity will be arising often to form a private network and go ahead with the communication. This will be the case essentially in activities like a group of people forming with moving laptops to form a network in order to undergo some conference system.
- If the organizations are going to have this system with them they can go ahead with the task of establishing the private moving objects network, and can go ahead with the communications of their intended

B. System Design

1) Elements of Design :

The design of the system includes the proper display of the motion of the nodes in good graphical means.

The design of system, basically involve the interface architecture. In the interface design we involve with the design of the user interface with GUI standards and a proper navigation system where the user need to enter into the flow of transactions starting with the entry in to the system by entering the nod of nodes values. Then the user can have the view of the intended graphical display through GUI Interface.

After the display is ready with the display of simulated motion of the nodes the user of the application is provided with the option of finding the routes between selected nodes of his desire. After the feasible path between selected nodes is displayed the user can check

the validity of the route by checking the computations generated on each node in terms of routing table. He can exercise this option by selecting the node name from the drop down list provided on the interface. Once the node is selected routing table for that will be displayed in easily viewable graphical display. In this way by check the routing tables all occurring in the path and can have verification of the path.

II) Design Philosophies:

The Routing Between Two Nodes is designed to provide the better understanding of the working model of the DSDV Protocol. The basic idea in implementing this system is to establish the fact that DSDV Protocol can be used in ad-hoc networks to decide the path to be chosen in order to facilitate the propagation of the message between the intended nodes.

C. Design Technique:

I) Use Case Diagram:

II) Class Diagram:

III) Screen Showing Simulated Motion of nodes:

IV. RELATED WORK AND COMPARISON

A mobile ad-hoc network is a kind of wireless ad-hoc network, and is a selfconfiguring network of mobile routers (and associated hosts) connected by wireless links, the union of which form an arbitrary topology. The routers are free to move randomly and organize themselves arbitrarily; thus, the network's wireless topology may change rapidly and unpredictably. Routing is the act of moving information from a source to a destination in an internetwork. During this process, at least one intermediate node within the internetwork is encountered. The routing concept basically involves, two activities:

- firstly, determining optimal routing paths
- secondly, transferring the information groups (called packets) through an internetwork.

The later concept which is known as packet switching is straight forward, but the path determination could be very complex. Routing protocols use several metrics to calculate the best path for routing the packets to its destination. The process of path determination is that, routing algorithms initialize and maintain routing tables, which contain the total route information for the packet. This route information varies from one routing algorithm to another. Proactive protocols maintain the routing information even before it is needed. 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. 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.

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. DSDV has advantages that it guarantees loop free path and count to infinity problem is also reduced. DSDV maintains the best path instead of maintaining multiple paths to every destination. With these advantages, DSDV also have some limitations, like: Wastage of bandwidth due to unnecessary advertising of routing information even if there is no change in the network topology and it doesn't support Multi path Routing.

V. CONCLUSION

In this paper we have define the operation of DSDV Protocol and various design technique using UML diagram for implementing DSDV protocol with any software language. It can automatically integrated with some minor changes in real time application where it communicates with hardware components (mobiles).

REFERENCES

- [1] Dr. Uwe Roth, "Highly dynamic destination-sequenced distance-vectorrouting", <http://wiki.uni.lu/secanlab/Highly+Dynamic+Destination-Sequenced+Distance-vector+Routing.html>.
- [2] P. Jacquet, P. Muhlethaler, A. Qayyum, A. Laouiti, L. Viennot and T. Clausen, "Optimized Link State Routing Protocol", Internet Draft, IETF MANET Working Group, draft-ietf-manet-olsr-04.txt, Mar. 2002.
- [3] R. G. Ogier, F. L. Templin, B. Bellur, M. G. Lewis, "Topology Broadcast Based on Reverse-Path Forwarding (TBRPF)", Internet Draft, IETF MANET Working Group, draft-ietf-manet-tbrpf-05.txt, Mar. 2002.
- [4] G. Pei, M. Gerla, and T.-W. Chen, "Fisheye State Routing in Mobile Ad Hoc Networks", Proceedings of Workshop on Wireless Networks and Mobile Computing, Taipei, Taiwan, Apr. 2000.
- [5] Perkins, C.E., and P. Bhagwat, "Highly dynamic destination sequenced distancevector routing (DSDV) for mobile computers:", Computer Communications Review, 1994, pp. 234–244.
- [6] P. F. Tsuchiya, "The Landmark Hierarchy: a new hierarchy for routing in very large networks", Computer Communication Review, vol.18, no.4, Aug. 1988, pp. 35-42.
- [7] Ching -Chuan Chiang, Hsiao-Kunag Wu, Winston Liu and Mario Gerla, "Routing in Clustered Multihop, Mobile Wireless Networks with Fading Channel," IEEE Singapore International Conference on Networks, SICON'97, pp. 197-211, Singapore, 16.-17. April 1997, IEEE