Implementation of Novel Routing Algorithm for Updating the Road Network Data Instantaneously

R.Aaditya mehra, Dr.G.Charan yadav

Research scholar, Assistant Professor, Department of Geology Science,
Haryana Agricultural University, India

Abstract **—** The objective of this paper is to improving the routing speed and identifying the shortest path to updating the road network information more frequently. This system provides a smooth transmission of data between the client and server by allowing the clients to query through the shortest path. The client can query to the server to get information about shortest path on the road and travel time of the path. There is lot of dynamic routing algorithms and mechanisms are available but this paper proposes the dynamic routing algorithm. This algorithm is well suited for updating the road network.

Keywords— routing, distance vector routing algorithm, road network, router configuration

I.INTRODUCTION

The routing of information from one location to another location without loss is a challenging task. The accuracy of data is very important in the real time environment, the road network is a huge network the path information of the road network must be optimized. The routing is a mechanism for transferring the data from one location to some other location. This routing must be done with the shortest path to reduce the time which taken by the routing algorithm. The data must be updated frequently then only we can get the accurate information about the road network. This system is used for controlling the traffic signals of the different countries. These methods accurately reflect the changes on the road transport network frequently. The dynamic routing is further classified as distance vector routing and link-state routing. Distance vector routing is an ARPHANET routing standard, with this routing mechanism each router keeps the routing table with shortest path updating frequently. The remaining portion of this paper will describes about different types of routing algorithms, distance vector routing and configuration of routers for the road network.

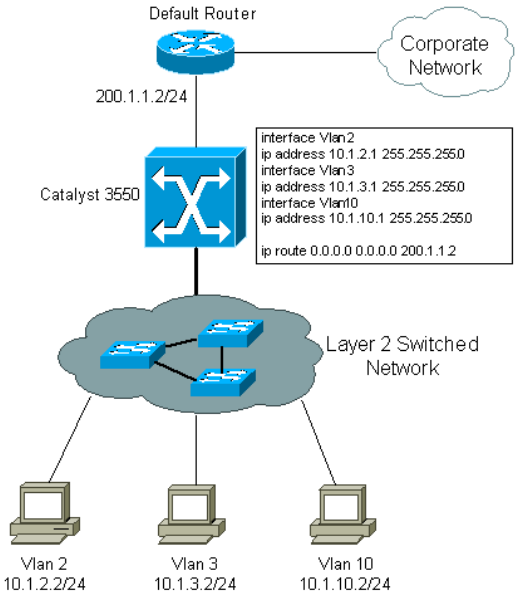
II. ROUTING

The term routing is the selecting the best path to deliver the data. Routing mechanism is used in many disciplines telephone network electronic data network, packet switching network and transportation network. The important function of the router is to forward the packet to the destination via a best path. The best path is identified by considering some of the parameters prefix length metric and administrative template. The packets are delivered to the destination with the following methods

- Unicast
- Multicast
- Anycast
- Broadcast
- Geocast

With the unicast packet delivery the updated routing table id send to the single node only. But in the multicast packet delivery is from many sources to different destinations. The broadcasting means delivering the data packets to the all the clients and same time or simultaneously. In the Anycast packet deliveries the packets are sending from one source to different nearest destination. With the Geocast packet delivery system the data packets are send to the selected group of network the network is identified by its location, which is used for geographic information sharing. The routing mechanism is characterized as two types static routing and dynamic routing. The static routing the network administrator manually configure, updates and modifies the routing table. With the dynamic routing algorithm the router itself will updates routing table according to the network topologies.

Fig.1 Routing Mechanism



III. ROUTING ALGORITHMS

The routing algorithm is used for finding the best path for forwarding the data packets to the destination. These routing algorithms consider the following metrics to finding the best path for routing.

- Reliability
- Bandwidth
- Delay
- Path length
- Load and communication cost

The routing algorithms are categorized as Static and Dynamic algorithm.

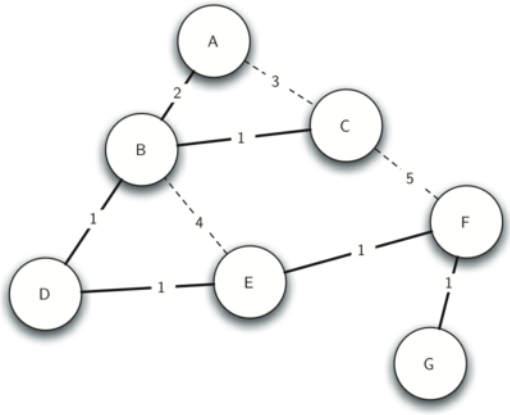
A. Static Routing Algorithm

In the static routing the network administrator must manually configure, update and modifies the routing table entries. The static routing is furtherly classified as

- Shortest path routing algorithm
- Flow based routing algorithm
- Flooding algorithm

The shortest path routing is furtherly classified as link state routing and distance vector routing. In the shortest path routing algorithm the best path is calculated based on the destination, bandwidth and minimum hope count. With the shortest path routing algorithm the directed graph is used to indicate the path between the sources to destination. The nodes in the directed graph are represents the intermediate routers between the source to destination.

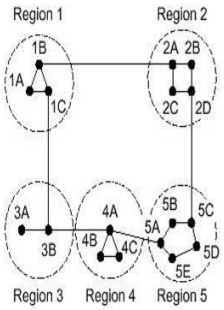
Fig.2 Static Routing Graph



IV. DYNAMIC ROUTING

The distance vector routing is used in most of the network, each network nodes knows the id of the other nodes. The routing table of the router is automatically updated whenever the change occurs in the network topologies. The routing table of dynamic routing algorithm updates the cost to reach the packet to the destination and total cost of the path. Each router in the network will advertise its routing table information to its neighbor nodes. The received routing table will be updated by its neighbor nodes. Consider the T_{ij} represents the cost of link from source to destination I is for the source and j is to destination, if there is no link between the source and destination then the T_{ij} is ✗. If there is link between the sources to destination then the link weight is updated or else the router keeps the already updated information.

Fig.3 Dynamic Routing Graph.



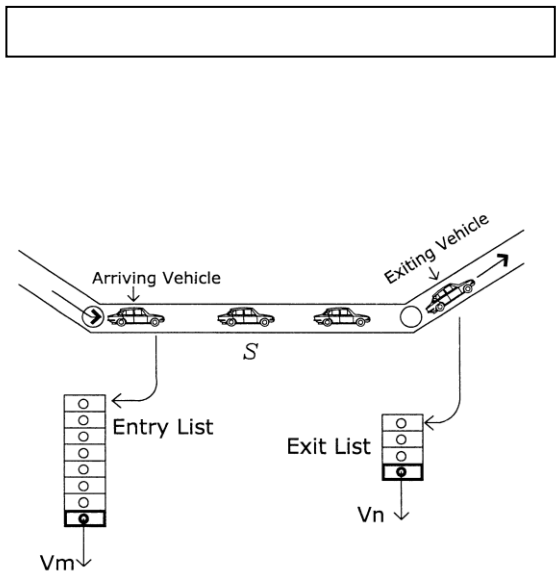
Full table for 1A

Dest.	Line	Hops
1A	–	–
1B	1B	1
1C	1C	1
2A	1B	2
2B	1B	3
2C	1B	3
2D	1B	4
3A	1C	3
3B	1C	2
4A	1C	3
4B	1C	4
4C	1C	4
5A	1C	4
5B	1C	5
5C	1B	5
5D	1C	6
5E	1C	5

Hierarchical table for 1A

Dest.	Line	Hops
1A	–	–
1B	1B	1
1C	1C	1
2	1B	2
3	1C	2
4	1C	3
5	1C	4

Fig.4 Road network control mechanism



V. ROAD NETWORK MONITORING

The location information is used for updating the road network via the cell phones. This information is processed and continuously updates the road signal information. The position information is obtained from the cellular networks and is stored in the database. Many countries use the traffic signal controller, to manage the congestion on the road. The traffic controller, network and the database are integrated to control the traffic and to manage the road network information. The data of the moving vehicle are updated and stored continuously on the database. These data are filtered by using the heuristics algorithm and the filtered data is compared to the road maps. There is lot of advantages by using this application. Such as

- Low cost to acquiring information
- No need of expensive infrastructure
- improvement in measurement constantly
- Higher coverage
- The stored information of the database allows to extract more process

The typical road network monitoring involves information and data gathering, keep a log, duty desk patrol surveillance, aerial observation finally developing and updating the procedures. The routers in the given network the routers must be configured as per the heuristics algorithms. The routing is the most important part of this road network control application because the router forwards the data packets from the long distance to its destination.

VI. CONCLUSION

In this study the development of application for road network monitoring and control is developed by using the distance vector routing mechanism. Even though the lot of routing mechanisms available the road network needs a frequently updatable routing algorithm so that the distance vector routing is used to build this road network monitoring application. Even this system is efficient to update the dynamic changes accurately the time taken to the update the routing table is somewhat lack compared to the traffic condition. This drawback is taken as a future work to reduce the time of routing table updates.

REFERENCES

1. Astarita, V., Bertini, R. L., d'Elia, S., Guido, G., Motorway traffic parameter estimation from mobile phone counts, European Journal of Operational Research, Vol.175, pp.1435-1446, 2006.
2. Bar-Gera, H., Evaluation of a cellular phone-based system for measurements of traffic speeds and travel times: A case study from Israel, Transportation Research Part C, Vol.15, pp.380-391, 2007.
3. Bennett, C.R., Chamorro, A., Chen C., de Solminihac, H., Flintsch, G.W., Data Collection Technologies for Road Management, Version 1.0, East Asia Pacific Transport Unit, The World Bank, Washington, D.C., April 2005.
4. Bishop, R., Arizona I-19 Wi-Fi Corridor: Assessment of Opportunities for Probe Data Operations, Report TRQS-02, prepared for the Arizona Department of Transportation, 2005.
5. Ehlert, A., Bell, M.G.H., Grosso, S., The optimisation of traffic count locations in road networks, Transportation Research Part B, Vol. 40 , pp. 460–479, 2006.
6. Bettstetter, et al.: GSM Phase 2+, General Packet Radio Service GPRS: Architecture, Protocols, and Air Interface, IEEE Communications Surveys, Third Quarter 1999, Vol. 2, No. 3.

7 Boudet, L., Midenet, S.: A Spatiotemporal Data Fusion Model for Occupancy State Estimation: An Evidential Approach. Presented at FUSION 2008, the 11th International Conference on Information Fusion, Cologne, Germany, 30 June - 3 July 2008.
8 Browne, R., Foo, S., Huynh, S., Abdulhai, B., & Hall, F.: Comparison and analysis tool for automatic incident detection. Freeway operations, high-occupancy vehicle systems traffic signal systems, and regional transportation systems management Transportation Research Record, 2005, 1925, pp. 58–65.
9 Capello, D., Liotti, L., Pallaro, N.: Sensore automotive per il rilievo dello stato strada. Published at Innovazione e Competitività (FIAT internal journal), July 2008.
10 Dempster, A.P.: The Dempster–Shafer calculus for statisticians, International Journal of Approximate Reasoning, Volume 48, Issue 2, June 2008, pp. 365-377.