ISSN (Online) 2278-1021
ISSN (Print) 2319 5940

International Journal of Advanced Research in Computer and Communication Engineering
Vol. 4, Issue 9, September 2015

A Survey on Optimal Link State Hop by Hop Routing

Lakshmana Kumar.S[1], D. Ramya Dorai[2]

P.G Scholar, Computer Science Engg, Adhiyamaan College, Hosur, Tamilnadu[1]

Assoc. Prof, Computer Science Engg, Adhiyamaan College, Hosur, Tamilnadu[2]

Abstract: Link State routing protocols do not view networks in terms of adjacent routers and hop counts. Using the SPF algorithm, the router creates a "topological database“. OSPF and IS-IS, split traffic evenly over shortest paths based on link weights. However, optimizing the link weights for OSPF/ IS-IS to the offered traffic is a well-known NP-hard problem, and even the best setting of the weights can deviate significantly from an optimal distribution of the traffic. A new link-state routing protocol, PEFT that splits traffic over multiple paths with an exponential penalty on longer paths. The survey shows the best routing algorithm by comparing the previous results with the algorithms named as link state, hop by hop, optimal and adaptive.

Keywords: Link State, Hop by Hop, Optimal, Adaptive.

I. INTRODUCTION

A Mobile Ad-hoc NETwork (MANET) is of a collection of mobile nodes that do networking functions such as packet forwarding, routing and service discovery without a fixed infrastructure. Nodes in MANET depend on each other in routing a packet to its destination because of limited range of each node’s wireless range.

A MANET is system of wireless nodes that communicate over wireless links which are having limited bandwidth. Each wireless node can work as a sender, receiver, and router. When a node acts as a sender, it can send message to any destination node with some route. When it acts as a receiver, node can receive messages from any other node in the network. When the node will work as a router, it can send the packet to destination or the next router in the route. MANET has many advantages over traditional wireless networks such as speed of deployment, easy deployment, less dependence on fixed infrastructure. Therefore, there is an emerging wireless networking field for future mobile communications. In moving towards MANET technology, the task of finding good solutions for the challenges such as security, routing, quality of service will play a crucial role for the success of Mobile Ad-hoc Network Technology.

Now coming to optimal routing the tradeoff has been lost performance. Though the resource utilization is very poor it results from the OSPF. It is not possible for even the best weight setting to lead to routing which deviates significantly through the optimal routing assignment.

There is a challenge to eliminate the tradeoff between optimality and ease of implementation in routing. The result is Hop-by-hop adaptive Link-state Optimal (HALO), a routing solution that retains the simplicity of link-state, hop-by-hop protocols while iteratively converging to the optimal routing assignment. There are multiple challenges to overcome when designing such a solution.

II. LITERATURE SURVEY

Broadly, the existing work can be divided into OSPF-TE, MPLS-TE, traffic demand agnostic/oblivious routing protocol design, and optimal routing algorithms. The work on OSPF has visualized on using good heuristics to increase the centralized link weight calculations. Even though these techniques have been shown to improve the algorithm’s performance significantly by finding better weight settings, the results are still far from optimal.
With this idea in mind, in the time between network changes when the topology and input traffic is static, we can do the following.

Network Node Configuration

Iteratively adjust each router’s split ratios and move traffic from one outgoing link to another. This only controls the next hop on a packet’s path leading to hop-by-hop routing. If instead we controlled path rates, we would get source routing.

Path Design

Increase the split ratio to the link that is part of the shortest path at each iteration even though the average price via the next-hop router may not be the lowest. If instead we forwarded traffic via the next-hop router with the lowest average price, we get Gallager’s approach, which is a distance vector solution.

Link Management

Adapt split ratios dynamically and incrementally by decreasing along links that belong to non shortest paths while increasing along the link that is part of the shortest path at every router. If instead split ratios are set to be positive instantaneously only to the links leading to shortest paths, then we get OSPF with weights.

HALO implementation

1. Discrete Implementation
2. High-Frequency Link-State Updates
3. Splitting Traffic

4. Interaction With Single-Path Routing

The HALO can be numerically evaluated with respect to

1. Convergence
2. Performance
3. Adaptivity
4. Asynchronous implementation
5. Coexistence with single-Path Protocol
6. Dependence on Initial Conditions
7. Different Algorithms Can End up With Different Split Ratios

The HALO can be experimentally evaluated with respect to

1. Implementing HALO in any tool(NS2, NetFPGA)
2. Verifying Optimality
3. Performance With Varying input traffic
4. Latency Comparison

III. COMPARISION OF ROUTING ALGORITHMS

Algorithm	Link-state	Hop-by-Hop	Optimal	Adaptive
OSPF	✓	✓	NIL	NIL
Gallager's	NIL	✓	✓	✓
Projected Gradient	✓	NIL	✓	✓
PEFT	✓	✓	NIL	NIL
HALO	✓	✓	✓	✓

After comparing the various algorithms the survey says that the Hop-Hop Adaptive Link-state optimal routing is best.

IV. SUMMARY

The preceding literature survey clearly states an important missing link—an optimal link-state hop-by-hop routing algorithm. Further, we can provide this missing link by introducing HALO. The convergence rate of the algorithm needs to be analyzed. There is an another direction involves developing the theory behind the performance of algorithm in the absence of synchronous link-state updates and executions.

V. ACKNOWLEDGMENT

I am thankful to Adhiyamaan college of Engineering (Autonomous), Hosur which gives me opportunity to do survey work as a post graduate scholar.

.

REFERENCES

[1] N. Michael, A. Tang, and D. Xu, "Optimal link-state hop-by-hop routing," in Proc. IEEE ICNP, 2013, pp. 1–10.

[2] R. Gallager, "A minimum delay routing algorithm using distributed computation,"IEEE Trans. Commun., vol.COM-25, no.1, pp.73–85, Jan. 1977.

[3] D.Xu, M.Chiang, and J.Rexford, "Link-state routing with hop-by-hop forwarding can achieve optimal traffic engineering, "IEEE/ACM Trans. Netw., vol. 19, no. 6, pp. 1717–1730, Dec. 2011.

[4] A. Sridharan, R. Guerin, and C. Diot, "Achieving near-optimal traffic engineering solutions for current OSPF/IS-IS networks," IEEE/ACM Trans.Netw., vol. 13, no. 2, pp. 234–247, Apr. 2005.

[5] M. Wang, C. W. Tan, W. Xu, and A. Tang, "Cost of not splitting in routing: characterization and estimation," IEEE/ACM Trans. Netw., vol. 19, no. 6, pp. 1849–1859, Dec. 2011.

[6] S. Srivastava, G. Agrawal, M. Pioro, and D. Medhi, "Determining link weight system under various objectives for OSPF networks using a Lagrangian relaxation-based approach," IEEE Trans. Netw. Service Manag. vol. 2, no. 1, pp. 9–18, Nov. 2005.

BIOGRAPHY

Lakshmana Kumar. S received the B.Tech degree in Information Technology from Adhiyamaan College of Engg., Anna University Chennai. He is currently pursuing an M.E., degree at Adhiyamaan college of Engineering, Hosur.