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Optimal Link State Hop by Hop Routing

[#1]Nitin Mane, [#2]Vishal Mahankale, [#3]Manisha Thorat, [#4]Nikhil Pardeshi
[#5]Prof. Sachin Patil

[2]vishalmahankale5@gmail.com

[#12345]Department of Computer Engineering

G.H. Raisoni College of Engineering and Management Wagholi
Pune.

ABSTRACT

We present HALO, the first link-state routing solution with hop-by-hop packet forwarding that minimizes the cost of carrying traffic through packet-switched networks. At each node, for every other node , the algorithm independently and iteratively updates the fraction of traffic destined to that leaves on each of its outgoing links. At each iteration, the updates are calculated based on the shortest path to each destination as determined by the marginal costs of the network's links. The marginal link costs used to find the shortest paths are in turn obtained from link-state updates that are flooded through the network after each iteration. For stationary input traffic, we prove that HALO converges to the routing assignment that minimizes the cost of the network. Furthermore, we observe that our technique is adaptive, automatically converging to the new optimal routing assignment for quasi-static network changes. We also report numerical and experimental evaluations to confirm our theoretical predictions, explore additional aspects of the solution, and outline a proof-of-concept implementation of HALO.

Keywords: HALO, traffic, MANET.

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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. PROPOSED SYSTEM

Our system implementation of HALO does not include a stopping criterion. Instead of, Principle for hybrid systems to prove that the dynamics converge to the optimal routing assignment[8]. Christo Ananth et al. [6] discussed about a system,the effective incentive scheme is proposed to stimulate the forwarding cooperation of nodes in VANETs. In a coalitional game model, every relevant node cooperates in forwarding messages as required by the routing protocol. This scheme is extended with constrained storage space. A lightweight approach is also proposed to stimulate the cooperation. In existing system of HALO algorithm does fact converge to the optimal solution even in a discrete implementation. The physical time needed to complete and iteration directly impacts the actual time that the algorithm takes to find the optimal solution. In fact, the need to converge to the optimal path, so it increased time in the routing table.

To avoid the using link state routing protocol for higly connected to the another node. There is chance to destroy the data by intruders. This routing assignment is choosen by halo, that takes only a root node.There is using Adaptive and optimal algorithm for combined for optimal path. Analytically bounding the required number of iterations remains open [7]. Instead, we use the evaluations in the time HALO takes to converge for reasonable step-sizes and find that for our test cases, a couple of hundred iterations is sufficient to reach the optimal routing assignment.

It calculates the time for hop by hop approach. Here introduce security for avoiding intruders from the table. Because it generate the hash key for every process. Then finally sends the data from source to destination In proposed system, we introduced optimization of routing algorithms.

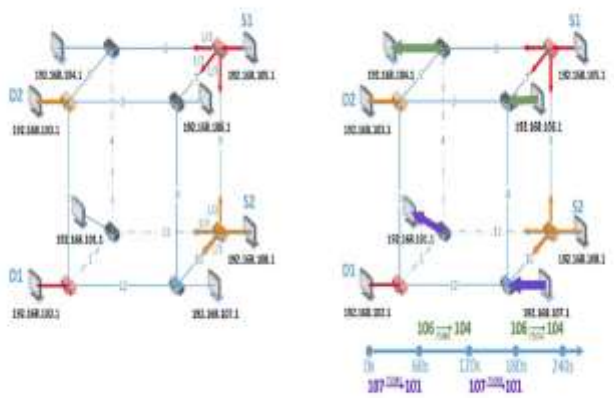
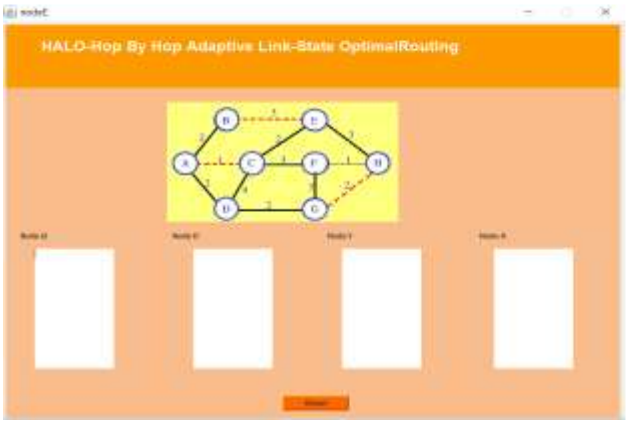


Fig 1. System architecture of HALO

IV. RESULT



V. CONCLUSION

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.

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