Effective Resource Allocation in flexible Overlay Routing

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Abstract— Overlay routing is the very attractive scheme that allows the improving certain properties of the routing without the need to change the standards of the current underlying routing. However, deploying overlay routing requires the placement and maintenance of overlay infrastructure. This gives rise to the following optimization problem: Find a minimal set of overlay nodes such that the required routing properties are satisfied. In this paper, we rigorously study this optimization problem. We show that it is NP- of the problem at hand. We examine the practical aspects of the scheme by evaluating the gain one can get over several hard and derive a nontrivial approximation algorithm for it, where the approximation ratio depends on specific properties real scenarios. The first one is BGP routing, and we show, using up-to-date data reflecting the current BGP routing policy in the Internet, that a relative small number of less than 100 relay servers is sufficient to enable routing over shortest paths from a single source to all autonomous systems (ASS), reducing the average path length of inflated paths by 40%. We also demonstrate that the scheme is very useful for TCP performance improvement (results in an almost optimal placement of overlay nodes) and for Voice-over-IP (VoIP) applications where a small number of overlay nodes can significantly reduce the maximal peer-to-peer delay.

Key words: TCP Improvement, BGP Routing, VOIP Applications, Autonomous systems (ASS), Round trip time (RTT) and Overlay Routing Resource Allocation (ORRA) and Hybrid Location Based Adhoc Routing (HLAR), Resilient Overlay Network.

I. Introduction

A Node capable of performing TCP Piping along route at smaller distances loops the use of Overlay routing is (i) to improve reliability (ii) to reduce latency in BGP routing. The benefit improving the routing to achieve routing properties to break the end-to-end feedback metric against cost. Overlay routing is an effective way loops into smaller a general optimization problem called the Overlay Routing Resource a shortest-path routing Allocation (ORRA) and studies its complexity. The goal is to find minimal number of relay node location can allow between the source-destination pairs. A Routing in BGP is policy based and depend on business relationship between ASS and a fraction of the paths along a shortest paths is called Path Inflation. In this paper, we concentrate on this point and study the minimum number of infrastructure nodes that need to be added in order to maintain a specific property in the overlay routing. In the shortest-path example, this may translate to: What is the minimal number routing over the Internet BGP-based routing example, underlying shortest path between them? In the TCP performance this question is mapped to: What is the minimum number of relay nodes that are needed in order to make each TCP connection, there is a path between the connection the routing between a groups of autonomous systems use the of relay nodes needed in order to make sure that for endpoints for which every predefined round-trip time, there is an overlay node capable of TCP Piping. Regardless of the specific implication in mind, we define general optimization problem called the Overlay Routing Resource Allocation (ORRA) problem and study its complexity. It turns out that the problem is NP-hard, and we present a nontrivial in improving routing properties between a single source node and a single approximation algorithm for it. Note that if we are only interested destination, then the problem is not complicated, and finding the optimal number of nodes becomes trivial since the potential candidate for overlay placement is small, and in general any assignment would be good. However, when we consider one-to-many or many-to-many scenarios, then a single overlay node may affect the path property of many paths, and thus choosing the best locations becomes much less trivial. We test our general algorithm in three specific such cases, where we have a large set of source-destination pairs, and the goal is to find a minimal set of locations, such that using overlay nodes in these locations allows to create routes such that a certain routing property is satisfied. The first scenario we consider is AS-level BGP routing, where the goal is to find a minimal number of relay node locations that can allow shortest-path routing between the source destination pairs. Recall that routing in BGP is policy-based and depends on the business relationship between peering ASS, and as a result, a considerable fraction of the paths in the Internet do not go along a shortest path. This phenomenon, called path inflation, is the motivation for this scenario. We consider a one-to-many setting where we want to improve routing between a single source and many destinations. This is the case where the algorithm power is most significant since, in the many-to-many setting, there is very little overlap between shortest paths, and thus not much improvement can be made over a basic greedy approach. I We demonstrate, using real up-to-date Internet data, that the algorithm can suggest a relatively small set of relay nodes that can significantly reduce latency in current BGP routing. The second scenario we consider is the TPC improvement example discussed above. In this case, we test the algorithm on a synthetic random graph, and we show...
that the general framework can be applied also to this case, resulting in very close-to-optimal results.

II. Problem Definition

A non negligible cost both in terms of capital and operating costs an algorithmic framework can be used in efficient Resource allocation in overlay routing. The set of routing path to deploy Overlay Routing over the actual physical infrastructure, one need to deploy and manage overlay nodes functionality is derived from the underlying scheme and the set of routing paths from the overlying routing schemes.

![Algorithm ORRA](image)

The ORRA Problem is a nonnegative weight function over the vertices to find a set as 1) feasible and 2) cost of minimal among the feasible sets. The underlying routing scheme is minimum hop count and overlay routing is shortest path with edge length graph. Deploying relay nodes that packet can be routed through concatenation of the underlying paths and packets can Every link is an underlying path, the link cannot be used both in underlying and overlay network and it can be removed from be routed. A feasible solution to the ORRA Problem. All nodes have an equal weight may as optimal solution.

Fig1: Overlay routing example: Deploying relay server on v6 and v7 enables overlay routing.

An approximation preserving reduction from the set covers (SC) Problem. An algorithm is the number of vertices required to each pair with the set of overlay paths. The algorithm can apply for an arbitrary weight function, capturing the cost of deploying a relay node may be different from one node to another. The algorithm picks vertices that weight is equal to zero until a feasible set. Each iteration at least one vertex gets a weight is equal to zero then worst case the algorithm stops after iteration and returns a feasible set. The actual performance of the algorithm, an approximation analysis may be emitted in implementation.

IV. System Analysis

Existing System: In the existing system, the authors studied the routing inefficiency in the Internet and used an overlay routing in order to be used on top of the network over the real environment. While evaluate and study experimental techniques improving infrastructure. A resilient overlay network (RON), which is architecture for application-layer overlay routing to the concept of using overlay routing to improve routing scheme was presented in this work, it did not deal with the deployment aspects and the optimization aspect of such them of this architecture is to replace the existing routing scheme, existing Internet routing infrastructure, has been presented in the current system. Similar to our work, the main goal if necessary, using the overlay infrastructure. This work mainly focuses on the overlay infrastructure (monitoring and detecting routing problems, and maintaining the overlay system), and it does not consider the cost associated with the deployment of such system.

Proposed System: The minimum number of infrastructure nodes can be added to maintain a overlay routing .The shortest path routing over the Internet, BGP-based routing: to make the routing. The system concentrates on this point and study the minimum number of infrastructure nodes that need to be added in order to maintain a specific property in the overlay routing. In the shortest-path routing over the Internet BGP-based routing example, this question is mapped to: What is the minimum number of relay nodes that are needed in (ASs) use the underlying shortest path between them? In the TCP performance example, this to make sure that for each order to make the routing between a groups of autonomous translate to: What is the minimal number of relay nodes needed systems TCP connection, there is a path between may in order the connection endpoints for which every predefined round-trip time (RTT), there is an overlay node capable of TCP Piping?

Regardless of the specific implication in mind, we define a general optimization problem called the Overlay Routing Resource Allocation (ORRA) problem and study its complexity. It turns out that the problem is NP-hard, and we present a nontrivial approximation algorithm for it. Between out the problem is a nontrivial approximation algorithm. Advantages: (i) Improving routing properties between a single source node and a single destination node. Finding the optimal number of nodes become trivial since overlay placement is small and assignment would be good. (ii) A single overlay node may affect the path property of many paths and choosing a best location becomes much less trivial.

Implementation

- **Service Provider**

  In this module, the Service Provider calculates the shortest path to BGP-based router. The Service provider browses Destination, The shortest-path routing over the Internet the required file and uploads their data files to the Specified End User (A, B, C, D) and with their DIP (Destination IP) of End User.
- **Overlay Router**
  The Overlay Router is responsible to route the file to the specified destination, the overlay routing scheme is the set of the shortest physical paths simplifies the execution of this system, and finding a minimal path to the destination using overlay routing, one can perform routing via shortest paths, the router is also responsible for Assigning the cost and also can view the cost of nodes with their tags From the node (from), To the node (to) and the cost.

- **BGP Router**
  The BGP Router is responsible to route the nodes using BGP routing, where the goal is to find a minimal number of relay node locations that can allow shortest-path routing between the source–destination pairs, BGP Router consider a one-to-many destination where we want to improve routing between a single source and many destinations. BGP routing table contains valid paths from its source to the entire set of nodes. BGP is also responsible for storing the possible path to destination, can view the recent routing path to destination with their tags Filename, Recent Path, Destination, DIP, Delay and date and time.

- **End User(Destination)**
  In this module, the End user (Node A, Node B, Node C, Node D) is responsible to receive the file from the Service source–destination nodes, the system consists of Provider In the shortest-path routing between the a one-to-many relationship. Where end User receives file from a single source to destination (Node A, Node B, Node C, Node D).

V. **System Architecture**

![System Diagram](image)

**Fig: system architecture**

**VI. Module Description**
The implementation consists of the following modules such as:

A) Node creation
B) Implementation of communication and routing
C) Performance analysis
D) Implementation of hybrid location – based routing protocol
E) Performance analysis and result comparison.

**a. Node Creation**
A Node is created. All the nodes are randomly deployed in the network area. Our network is a wireless network, nodes are assigned with mobility.

**b. Implementation of communication and Routing:**
A communication between nodes is provided. Sender and Receiver nodes are randomly selected. Communication traffic is enabled between nodes. A sample routing is performed with anyone of the familiar routing protocol.

**c. Performance Analysis**
The performance of the routing protocol is analyzed. Based on the analyzed results X-graphs are plotted. Throughput, delay, energy consumption are the basic parameters considered here and X-graphs are plotted for these parameters.

**d. Implementation of hybrid location-based routing protocol:**
A hybrid location-based routing protocol is implemented. Instead of using normal routing, location based routing is used to communicate with the nodes. The proposed protocol uses RREQ and RREP control packets along with location information.

**e. Performance analysis and result comparison:**
The performance of the proposed protocol is analyzed. Based on the analyzed results X-graphs are plotted. Throughput, delay, energy consumption are the basic parameters considered here and X-graphs are plotted for these parameters.

**Results**

**Screen Shots**
VI. Conclusion
The fundamental problem developing an approximation algorithm to the problem a customized algorithm for specific application framework that fits a large set of overlay applications. The connection between achieved due to the improved routing is not trivial and to investigate it. A BGP Routing can be used the connection between achieved due to the improved routing is not trivial and to investigate it. A BGP Routing can be used. Three different scenarios, evaluated the performance of the algorithm, the cost in terms of establishing overlay nodes and performance gain showing the algorithm provides close-to-optimal results. An Analytical study of the vertex cut used in the algorithm. To find Properties of the underlay and overlay routing bound on the size of the cut. by a large content provider in order to improve the user experience of its customers. The VOIP Scheme can be used by VOIP services to improve call quality of their customers. The exact translation of the service performance gain into actual revenue is not clear.

VIII. Future Enhancement
Hybrid Location-based protocol (HLAR) combines a modified AODV protocol with a greedy-forwarding geographic routing protocol. The expected transmission count (ETX) to calculate the quality (ETX) of shared links, nodes to locally the broken routes to their source node. To allow nodes the node’s packets include a time-to-live (TTL) will be each time the protocol to avoid unnecessary flooding the source node beacon packets periodically. The periodic beacon packets include metric to find the best quality route. The modified form of AODV ID and the current location coordinates. HLAR initiates the route discovery in on-demand fashion. The RREQ as AODV ETX, intermediate nodes report a current node cannot use location information and RREQ Packet will be dropped the source node and destination node. The TTL field is decremented once its TTL field become zero. It allows according to the hop count between of the whole network. A destination node replies to receives RREQ Packets with a route reply (RREP) packets in three cases:
1. If RREQ packet is first receives from source node
2. If RREQ packet contains a higher source sequence number than RREQ packets responded to the Destination Node.
3. If RREQ Packet contains same source sequence number as RREQ Packets respond by the destination node, but the new packet indicates a better quality route is available.

References


