IMPLEMENTATION OF OBJECT ORIENTED APPROACH TO LOWEST-COST ROUTING USING BGP

CH M KRISHNA MENTADA[1], G.NAGESWARA RAO[2]

[1]Department of Information Technology, Aditya Institute of Technology And Management, Tekkali, Andhra Pradesh, India

[2]H.O.D,MISTE,MCSE, Department of Information Technology, Aditya Institute of Technology And Management, Tekkali, Andhra Pradesh, India

Abstract—Now a day's routing mechanism-design point of view, inter domain is problem. To overcome this various researchers proposed different techniques, but still there are issues in this area. To fulfill this, in this paper we propose an approach, which is using an existing protocol as a substrate for distributed computation may prove useful in future development of Internet algorithms generally, not only for routing or pricing problems. Our design and analysis of a strategy proof, BGP-based routing mechanism provides a new, promising direction in distributed algorithmic mechanism design, which has heretofore been focused mainly on multicast cost sharing.

Index Terms— **Object Oriented approach, BGP , Low cost Routing.**

I. INTRODUCTION

The Internet is comprised of many separate administrative domains known as Autonomous Systems (ASs). Routing occurs on two levels, intradomain and intradomain, implemented by two different sets of protocols. Intradomain-routing protocols, such as OSPF, route packets within a single AS. Intradomain routing, currently handled by the Border Gateway Protocol (BGP), routes packets between ASs. Although routing is a very well-studied problem, it has been approached by computer scientists primarily from an engineering or "protocol-design" perspective[1-3].

In their seminal paper on algorithmic mechanism design, Nisan and Ronen [4] advocate combining an economic; "incentive-compatibility" approach with the more traditional protocol-design approach to the problem. Internet routing is an extremely natural problem in which to consider incentives, because ownership, operation, and use by numerous independent, self-interested parties give the Internet the characteristics of an economy as well as those of a computer. In this paper, we continue the study of routing from a mechanism-design perspective, concentrating specifically on inter domain routing, for reasons explained below.

In our formulation of the routing-mechanism design problem, each AS incurs a per-packet cost for carrying traffic, where the cost represents the additional load imposed on the internal AS network by this traffic. To compensate for these incurred costs, each AS is paid a price for carrying transit traffic, which is traffic neither originating from nor destined for that AS. It is through these costs and prices that consideration of "incentive compatibility" is introduced to the inter domain-routing framework, which, as currently implemented, does not explicitly consider incentives. Our goal is to maximize network efficiency by routing packets along the lowest-cost paths (LCPs). We are following previous work on mechanism design for routing [5,6] by introducing incentives in this way, and focusing on lowest-cost paths.

The main difference between this paper and previous algorithmic mechanism design for routing is our focus on computing the routes and prices in a distributed fashion. Furthermore, in order to steer the mechanism-design approach towards practical implementation, we consider only distributed algorithms that retain the data structures and communication protocol of BGP. In this we develop a "BGP-based computational model" to capture these requirements and seek to compute the routes and prices.

A. Applications

The main operation of a BGP-based Mechanism for Lowest-Cost Routing is to monitor the physical environment, process the sensed information, and deliver the results to some specific sink nodes. Sensor nodes are normally powered by batteries with limited energy resource. Therefore, the primary challenge for this energy- constrained system is to design energy-efficient protocols to maximize the lifetime of the network. Since radio transmission is the primary source of power consumption the design of communication protocols for topology management, transmission power control, and energy-efficient routing has been the focus of many studies. Among these schemes, energy-efficient routing is one of the well-studied approaches for both wireless ad hoc networks and sensor networks[7,8].

The basic idea is to route the packet through the least cost paths so as to minimize the overall energy consumption for delivering the packet from the source to the destination. The drawback of this approach is that it tends to overwhelm the nodes on the least cost path, which is undesirable for sensor networks since all sensor nodes are collaborating for a common mission and the duties of failed nodes may not be taken by other nodes.

II. LITERATURE SURVEY

Given a set of costs, the LCPs can be computed using standard routing protocols (such as BGP). However, under many pricing schemes, an AS could be better off lying about its costs; such lying would cause traffic to take non-optimal routes and thereby interfere with overall network efficiency. To prevent this, we first ask how one can set the prices so that ASs have no incentive to lie about their costs; such pricing schemes are called “strategyproof.” We also require that ASs that carry no transit traffic receive no payment. We prove that there is only one strategyproof pricing scheme with this property; it is a member of the Vickrey–Clarke–Groves (VCG) class of mechanisms [9-11]. This mechanism requires a per-packet price to be paid to each transit node k; this price is determined by the cost of the LCP and the cost of the lowest-cost path that does not pass through k. We next ask how the VCG prices should be computed, and we provide a “BGP-based” distributed algorithm that accomplishes this.

Our results contribute in several ways to the understanding of how incentives and computation affect each other in routing-protocol design. Nisan and Ronen [4] and Hershberger and Suri [12] considered the LCP mechanism-design problem, motivated in part by the desire to include incentive issues in Internet-route selection. The LCP mechanism studied in takes as input a biconnected graph, a single source, a single destination, and a (claimed) transmission cost for each link.

III. PROPOSED SYSTEM ARCHITECTURE

A. *Existing System:*

The drawback of previous approaches is that it tends to overwhelm the nodes on the least cost path, which is undesirable for sensor networks since all sensor nodes are collaborating for a common mission and the duties of failed nodes may not be taken by other nodes. A few schemes have been proposed to address this problem by studying the maximum lifetime routing problem. The problem focuses on computing the flow and transmission power to maximize the lifetime of the network, which is the time at which the first node in the network runs out of energy. Some distributed solutions based on sub gradient algorithms and utility-based algorithm have been proposed. The common assumption of these works is that the data flows are conserved during the transmission from the nodes to the sink node, which however is not true for sensor networks because data collected by neighboring nodes are often spatially correlated.

B. Proposed System

The proposed method requires maintaining two trees—the coding tree for raw data aggregation and the Border gateway protocol (BGP) for delivering the compressed data to the sink node. These works demonstrate that data aggregation can greatly improve the performance of various communication protocols. By jointly optimizing routing and data aggregation, the network lifetime can be extended from two dimensions. One is to reduce the traffic across the network by data aggregation, which can reduce the power consumption of the nodes close to the sink node. The other is to balance the traffic to avoid overwhelming the bottleneck nodes. In this paper, we present a model to integrate routing and data aggregation. We adopt the geometric routing whereby the routing is determined solely according to the nodal position. This allows different data correlation models such as that in to be incorporated without intervening the underlying routing scheme.

C. Border Gateway Protocol (BGP) Routing Protocol:

The Border Gateway Protocol (BGP) is the core routing protocol of the Internet. It maintains a table of IP networks or 'prefixes' which designate network reachability among Autonomous Systems (AS). It is described as a path vector protocol. BGP does not use traditional Interior Gateway Protocol (IGP) metrics, but makes routing decisions based on path, network policies and/or rule sets. BGP was created to replace the Exterior Gateway Protocol (EGP) routing protocol to allow fully decentralized routing in order to allow the removal of the NSFNet Internet backbone network. This allowed the Internet to become a truly decentralized system. Since 1994, version four of the BGP has been in use on the Internet. All previous versions are now obsolete. The major enhancement in version 4 was support of Classless Inter-Domain Routing and use of route aggregation to decrease the size of routing tables.

Most Internet users do not use BGP directly. However, since most Internet service providers must use BGP to establish routing between one another (especially if they are multihomed), it is one of the most important protocols of the Internet. Compare this with Signaling System (SS7), which is the interprovider core call setup protocol on the PSTN. Very large private IP networks use BGP internally.

D. BGP Operation:

BGP performs three types of routing[3] interautonomous system routing, intraautonomous system routing, and pass-through autonomous system routing.

i. Inter autonomous system routing:

It was occurs between two or more BGP routers in different autonomous systems. Peer routers in these systems use BGP to maintain a consistent view of the internetwork topology. BGP neighbors communicating between autonomous systems must reside on the same physical network. The Internet serves as an example of an entity that uses this type of routing because it is comprised of autonomous systems or administrative domains. Many of these domains represent the various institutions, corporations, and entities that make up the Internet. BGP is frequently used to provide path determination to provide optimal routing within the Internet.

ii. Intra-autonomous system routing:

It was occurs between two or more BGP routers located within the same autonomous system. Peer routers within the same autonomous system use BGP to maintain a consistent view of the system topology. BGP also is used to determine which router will serve as the connection point for specific external autonomous systems.

Once again, the Internet provides an example of interautonomous system routing. An organization, such as a university, could make use of BGP to provide optimal routing within its own administrative domain or autonomous system. The BGP protocol can provide both inter- and intra-autonomous system routing services.

iii. Pass-through autonomous system routing:

It was occurs between two or more BGP peer routers that exchange traffic across an autonomous system that does not run BGP. In a pass-through autonomous system environment, the BGP traffic did not originate within the autonomous system in question and is not destined for a node in the autonomous system. BGP must interact with whatever intra-autonomous system routing protocol is being used to successfully transport BGP traffic through that autonomous system. Figure 1 illustrates a pass-through autonomous system environment.

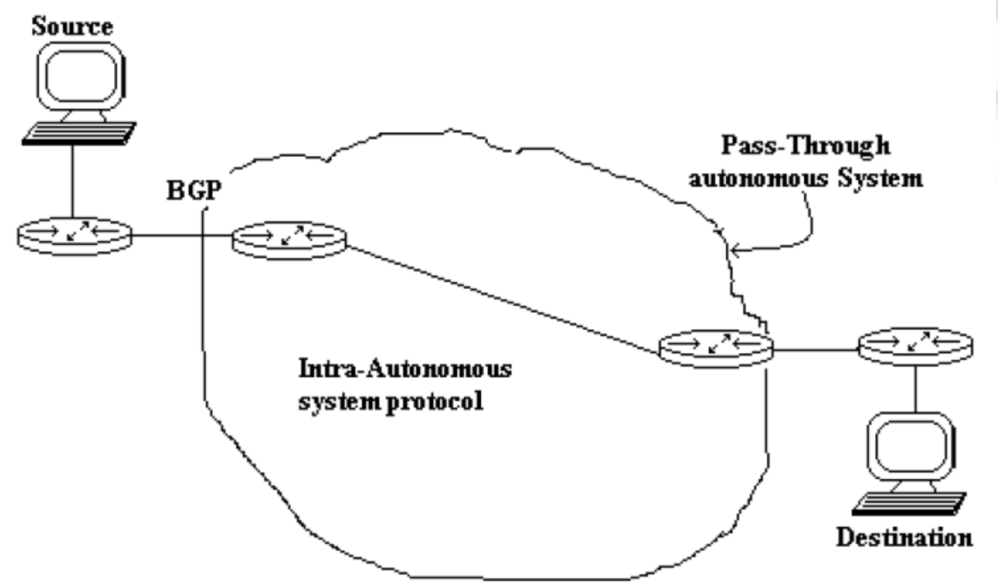


Fig 1 In pass-through autonomous system routing, BGP pairs with another Intra-autonomous system-routing protocol.

E. BGP Algorithm Description

To compute these prices *pk ij* , using a computational model based on BGP, which is the repository of interdomain routing information. Assume that there is at most one link between any two ASs, that the links are bidirectional, that there is no route aggregation, and that each AS can be treated as an atomic entity without regard to intradomain routing issues. The network can then be modeled as a graph in which every node represents an AS, and every edge represents a bidirectional interconnection between the corresponding ASs.

IV. IMPLEMENTATION

A. *Understanding Ports:*

Data transmitted over the Internet is accompanied by addressing information that identifies the computer and the port for which it is destined. The computer is identified by its 32-bit IP address, which IP uses to deliver data to the right computer on the network. Ports are identified by a 16-bit number, which TCP and UDP use to deliver the data to the right application.

In connection-based communication such as TCP, a server application binds a socket to a specific port number. This has the effect of registering the server with the system to receive all data destined for that port. A client can then rendezvous with the server at the server's port, as illustrated here:

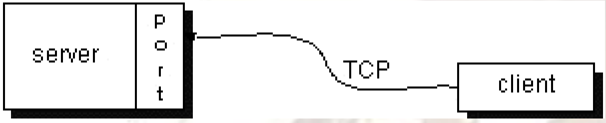


Fig 2 Socket connection

The resource name is the complete address to the resource. The format of the resource name depends entirely on the protocol used, but for many protocols, including HTTP, the resource name contains one or more of the components listed in the following Host Name:

The File Name: The pathname to the file on the machine.

Port Number: The port number to which to connect (typically optional).

Reference: A reference to a named anchor within a resource that usually identifies a specific location within a file (typically optional).
destination

B. *Modules Description*

In this paper our problem consists of three modules

i. Module 1

Creating the user interface which contains source and which is randomly generated by random class and neighbor nodes which is used to identify the all the active nodes in the autonomous system, destination address where we have to send the data, sending data field, received data field where we are browse the data to be send in the sending data if in the case of receiver receive the data in the received data field. Low Cost Path which calculate the entire possible source and destination routes in which gives the best path which one is the Low Cost Path.

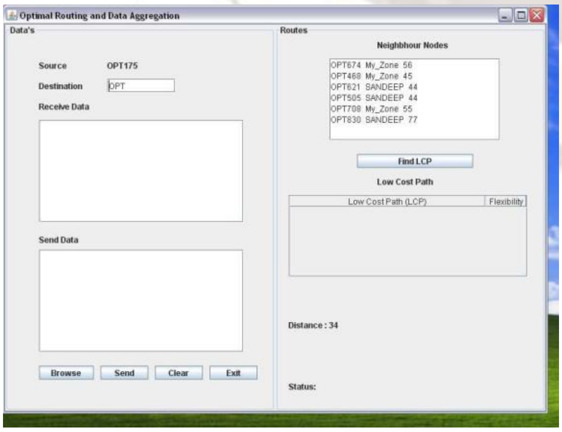
ii. Module 2

To send the data we have to enter the destination address by selecting the of neighbouring nodes. Enter the destination address in appropriate field and enter the data in sending data field by typing or browsing. And click on the send button to send the data to the destination address. And the status field gives the information about the data which is delivered or not.

iii. Module 3

Calculation of Low Cost Path is based on first find out the all possible paths and calculates the cost for each path base on the VCG Mechanism, and gives the best low cost path to send the data.

The following figures represent the actual user interfaces. In Fig 3 we finding or gathering the neighbor node information, based on this we have to follow further procedure. In Fig 4 we find the optimal route info based on above said algorithms. In Fig 5 we chose our required file and send it to destination, in Fig 6 we show the info at



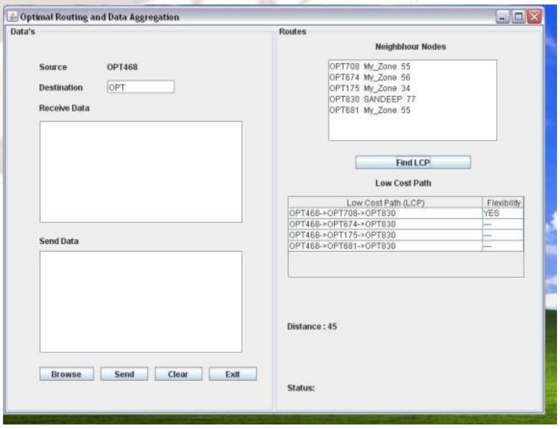
Source OPT175
Destination OPT

OPT674 My_Zone 56
OPT468 My_Zone 45
OPT621 SANDEEP 44
OPT505 SANDEEP 44
OPT708 My_Zone 55
OPT830 SANDEEP 77

Low Cost Path (LCP)	Flexibility

Distance : 34
Status:

Fig 3 Finding neighbor nodes



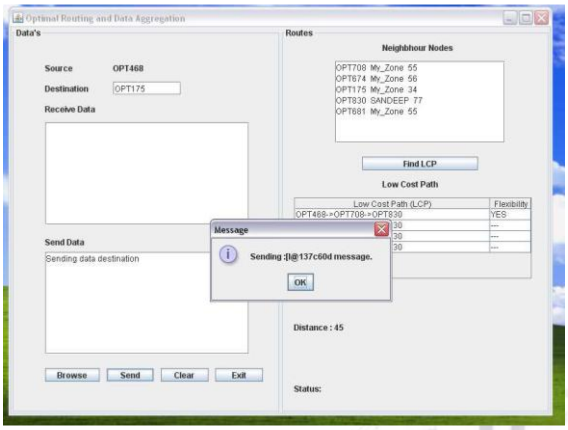
Source OPT468
Destination OPT

OPT708 My_Zone 55
OPT674 My_Zone 56
OPT175 My_Zone 34
OPT830 SANDEEP 77
OPT681 My_Zone 55

Low Cost Path (LCP)	Flexibility
OPT468->OPT708->OPT830	YES
OPT468->OPT674->OPT830	---
OPT468->OPT175->OPT830	---
OPT468->OPT681->OPT830	---

Distance : 45
Status:

Fig 4 Finding optimal routes to the destination



Source OPT468

Destination OPT175

Sending data destination

OPT708 My_Zone 55
OPT674 My_Zone 56
OPT175 My_Zone 34
OPT830 SANDEEP 77
OPT681 My_Zone 55

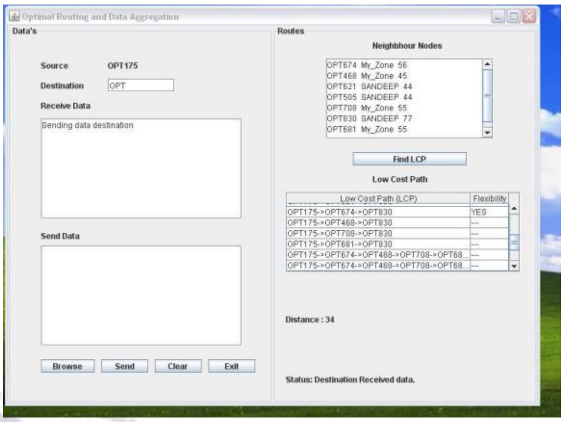
Low Cost Path (LCP)	Flexibility
OPT468->OPT708->OPT830	YES
30	---
30	---
30	---

Sending :[I@137c60d message.

Distance : 45

Status:

Fig 6.6 Sending data to the destination



Source OPT175

Destination OPT

Sending data destination

OPT674 My_Zone 56
OPT468 My_Zone 45
OPT621 SANDEEP 44
OPT505 SANDEEP 44
OPT708 My_Zone 55
OPT830 SANDEEP 77
OPT681 My_Zone 55

Low Cost Path (LCP)	Flexibility
OPT175->OPT674->OPT830	YES
OPT175->OPT468->OPT830	---
OPT175->OPT708->OPT830	---
OPT175->OPT681->OPT830	---
OPT175->OPT674->OPT468->OPT708->OPT68...	---
OPT175->OPT674->OPT468->OPT708->OPT68...	---

Distance : 34

Status: Destination Received data.

Fig 6.7 Received data at destination

V. CONCLUSION

Motivated by the extensive operation experience behind BGP we proposed this paper. In this paper we discussed a basic approach to BGP for shortest and lowest cost routing based on the OSPF technique. Here may be BGP routing table data increases but decreases the lot of cost to transfer the data to destination mainly in the case of mobile ad-hoc networks.

Future Enhancement

The BGP-based routing mechanism provides a new, promising direction in distributed algorithmic mechanism design, which has heretofore been focused mainly on multicast cost haring. The BGP routing algorithm can also be implemented in WAN networks.

References

[1]. Archer, A., Feigenbaum, J., Krishnamurthy, A., Sami, R., Shenker, S.: Approximation and collusion in multicast cost sharing. Games Econ. Behav. 47, 36–71 (2004)

[2]. Feigenbaum, J., Krishnamurthy, A., Sami, R., Shenker, S.: Hardness results for multicast cost sharing. Theoret. Comput. Sci.304, 215–236 (2003)

[3]. Feigenbaum, J., Papadimitriou, C., Sami, R., Shenker, S.: A BGP-based mechanism for lowest-cost routing. In: Proceedings of the 21st symposium on principles of distributed computing, pp. 173–182. ACM Press, New York (2002)

[4]. Nisan, N., Ronen, A.: Algorithmic mechanism design. Games Econ. Behav. 35, 166–196 (2001)

[5]. Hershberger, J., Suri, S.: Vickrey prices and shortest paths: What is an edge worth? In: Proceedings of the 42nd symposium on the foundations of computer science, pp. 129–140. IEEE Computer Society Press, Los Alamitos (2001)

[6]. Griffin, T.G., Wilfong, G.: An analysis of BGP convergence properties. In: Proceedings of SIGCOMM '99, pp. 277–288.ACM Press, New York (1999)

[7]. Tangmunarunkit, H., Govindan, R., Shenker, S.: Internet path inflation due to policy routing. In: Proceeding of SPIE ITCom 2001, pp. 19–24. SPIE Press, Bellingham (2001)

[8]. Shneidman, J., Parkes, D.: Specification faithfulness in networks with rational nodes. In: Proceedings of the 23rd symposium on principles of distributed computing, pp. 88–97. ACM Press, NewYork (2004)

[9]. Vickrey, W.: Counterspeculation, auctions, and competitive sealed tenders. J. Finance 16, 8–37 (1961)

[10]. Clarke, E.: Multipart pricing of public goods. Public Choice 11,17–33 (1971)

[11]. Groves, T.: Incentives in teams. Econometrica 41, 617–663 (1973)

[12]. Hershberger, J., Suri, S.: Vickrey prices and shortest paths: What is an edge worth? In: Proceedings of the 42nd symposium on the foundations of computer science, pp. 129–140. IEEE Computer Society Press, Los Alamitos (2001)