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Stochastic Divination of Reckoning Enactment on Multi Class Queuing System

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Abstract

Stochastic systems play a prominent role in computer graphics, because of their success in modeling a variety of complex and natural phenomena. Routing plays a vital role on the performance and functionality of computer networks. Routing networks means identifying a path in the network that optimizes a certain criterion which is called as Quality of Service (QoS) routing. The main aim of seclusion is minimizing the reckoning effort by maximizing the probability of having a path between source-destination pairs in the network. This paper deals with the specification and analysis of routing procedures which are effective for large hoard and promote packet switched computer networks. The new concept of stochastic seclusion method is introduced to resolve the scalability in QoS routing algorithm. A queue discipline in multiclass network is analyzed. An optimization algorithm is designed for seclusion strategy using stochastic technique in which the routing functions in the network are being increased. Numerical calculations and graphical representation shows that the proposed method improves the performance measure in terms of reduction in reckoning effort.

Keywords: Routing, Scalability, Reckoning Effort, Large Networks, Quality of Service, Network Seclusion.

1. Introduction

Broadband of integrated service networks are expected to support applications with QoS requirements. In many applications that has need service guarantees in order to function ingeniously. A communication network consists of a set of nodes which are connected by a set of links. A path is defined in the network where a collection of sequential communication links eventually connecting two nodes to each other. The process of finding and selecting the paths in the network is termed as routing function. A routing policy is a decision rule that selects which nodes to take next based on the current time and realize network link. The objective of routing technique is (i) distribute and searching the state information in optimal way of the network (ii) how to reduce the reckoning effort in searching for a path. The main drawback of all modern routing algorithms is in lack of ability to scale the

large networks proficiently. Network seclusion is the solution to enhancing the scalability in large networks. Network seclusion decomposes a network into sub networks according to particular rules and considerably reduces the reckoning effort of routing. The stochastic seclusion method that dynamically change a network seclusion according to traffic patterns in the network in order to minimize an objective function that reflects the reckoning effort involved in routing algorithm used in the network. In this method, the probabilities used to partition the network correspond to the frequency of connection requests between every pair of nodes in the network. Scalability in communication network had been developed by Mishra [1]. Orda et al. [2] has clearly explained a scalable approach to the partition of QoS requirements in unicast and mulitcast. Hao et al. [6] had explained the scalable QoS routing performance evaluation of topology aggregation. Gupta et al. and Stolyar [8], has clearly envisaged the Optimal

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throughput allocation in general access networks. Ching et al. [5] has analyzed the optimal service capacities in a competitive multiple-server queueing environment. Leonardi et al. [10] had approached the Joint optimal scheduling and routing for maximum network throughput. Lin et al. [11] had analyzed an optimization based approach for quality of service routing in high-bandwidth networks. Orda et al. [14] had approached the pre-reckoning schemes for QoS routing. Deb et al. [16] had given a detailed explanation of a new approach to scale quality of service routing algorithms.

The rest of the paper is organized as follows: Section 3 describes the routing reckoning structure of packet switching network. Section 4 discusses stochastic seclusion and introducing some notations. Section 5 explains the overhead in scalability systems. Section 6 graphical representation is discussed. Finally section 7 concludes the paper.

1.1 Steering Reckonable Structure

The basic component of QoS routing structure is path selecting that can operate in a link state routing protocol environment where different information can be used in two different scales.

The goal of routing reckoning structure is

- (a) to reduce the impact of flow setup time
- (b) to avoid user level re-attempt in heavily loaded network
- (c) to select a route quickly in possible paths

The structure consists of three stages at different time scale:

- (i) First Round Path Communicating (FRPC) stage.
- (ii) Sorted Path Ordering (SPO) stage
- (iii) Recognized Route Assortment (RRA) stage.

The First Round Path Communicating (FRPC) stage does preliminary determination of a set of possible paths from a source node to destination node. The Sorted Path Ordering (SPO) stage follows Markov process (selects the most recent states of all links available to each node) and filters it to provide a set of QoS acceptable paths. Moreover, this phase order the routes from most to least acceptable paths which is obtained from list of FRPC stage. The Recognized Route Assortment (RRA) stage follows that to select a definite route as swiftly as possible based on the pruned available paths from the SPO stage. The main advantage of this structure is that various distributed routing schemes can fit into this structure and multiple QoS requirements can be used.

1.2 Routing for Packet Switching Networks

In satellite communication among the network resources is accomplished by the communication sub network. In packet switching network, the messages are wrecked into small segments and then which are transmitted through the network in the form of hoard and promote switching. A packet is transmitted from source node to destination node, which may be hoard in queue at any intermediate node for transmission and then promote to the next node. The selection of the next node is based on the routing policy. Routing policy has divided into two categories: Deterministic (Design phase) and Adaptive (Networks Operation).

Adaptive policy plays a vital role for triumphant operation of networks and it describes the state of the network. A central node Figure 1., providing the routing information to all sub nodes in the network which computing the information directly.

2. Stochastic Seclusion

Stochastic seclusion technique is designed to partition the original network into a number of blocks which enhancing the scalability routing algorithm in large networks. In this method network is partitioned in a probabilistic manner that corresponds to the frequency of connection requests between every pair of nodes in the network. The main objective of stochastic seclusion is to minimize the mean reckoning effort spent by the routing algorithms used in the network by maximizing the chance of selecting a source-destination pair in the same block of the partition. In particular, if the source-destination pair in the same block there must exist at least one path between every pair of nodes in the block which is termed as irreducible. For low connectivity network the partition is more difficult with irreducible blocks whereas easily constructed in high connectivity network. Thus each block should consist of at least two nodes in order to have communication between them.

3. Mathematical Model

The objective is to minimize a quantitative measure for any network seclusion structure in terms of the reckoning effort in routing. The mean reckoning effort in finding a path satisfy the constraints from a source node to destination node, averaged overall source-destination pairs, in a network of K nodes and Z links be $\psi(K, Z)$. The objective function of reckoning effort is defined as

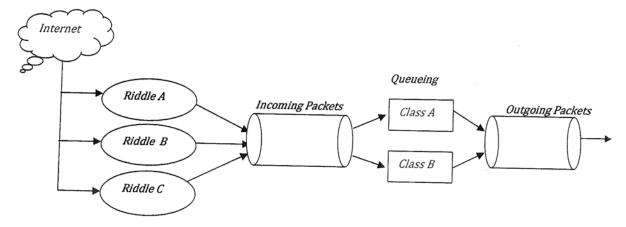


Figure 1. Queue Discipline in Multiclass Network.

$$C(K,Z) = \min \left[\bigcup_{i=1}^{N} P_i \ \mathcal{Y}_i(K_i, Z_i) + (1 - \bigcup_{i=1}^{N} P_i) \ \mathcal{Y}(K,Z) + P(K,Z) \right]$$

where, Pi represents the probability that given a connection request when both source and destination nodes located in the same block, P(K,Z) represents the seclusion overhead per connection request, $\bigcup\limits_{i=1}^N P_i \ \ \varPsi_i(K_{i,}Z_i)$ represents the reckoning effort involved when both source and destination nodes located in the same block and $\left[1-\bigcup\limits_{i=1}^N P_i\ \right]\varPsi(K,Z)$ represents the reckoning effort when both source and destination nodes located in the different block

For p Let, Pij be the conditional probability that given a connection request from source node 'i' to the destination node 'j'. Pij is defined as follows:

$$P_{ij}(\omega) = \frac{\eta_{ij}(\omega)}{\sum_{\substack{i,j \in N \\ i \neq i}} \eta_{ij}(\omega)}$$

where, η_{ij} denotes the number of times source node i has requested a connection to destination node in the last ω time unit.

 $P_{ii}(\omega)$ will be more accurate, as the time unit ω increases

$$\begin{split} & \lim_{\omega \to \infty} P_{ij}(\omega) = P_{ij} \\ P_{ij}(b) = & \frac{C_{n_{b-2}}^{N-2}}{C_{n_b}^{N}} = \frac{\frac{(N-2)!}{(b-2)!(N-2-b+2)!}}{\frac{(N)!}{(n_b)!(N-n_b)!}} = \frac{(n_b-1)(n_b)}{(N-1)N} \end{split}$$

where, n_b denotes the number of nodes in block b and N denotes the number of nodes of the network.

4. Scalability Systems Overhead

The most important constraint on seclusion is partition overhead. There are two major types of overhead are routing update reduction and route reckoning reduction.

The routing update reduction provides the information continuously updated to the network nodes through routing information. Additionally frequent updated routing leads to a better routing performance in the network and also consumes more network bandwidth and processing power. Reducing update frequency which degrades the routing performance due to lack of routing information. Reduction of routing update frequency in two ways: (i) searching for appropriate routing update trigger policies to provide controllable update frequency and predictable accuracy, (ii) designing appropriate routing algorithms to minimize the impact of stale routing information.

The route reckoning reduction is essential for achieving high-quality routing performance and scalability. Route pre-reckoning and path catching are the two major approaches in order to reduce route reckoning. Route pre-reckoning is used to compute and store the paths to all destinations before the request which leads that minimize the request operations. Moreover, that it helps to compute multiple paths to the same destination nodes and also balance the traffic load. Path catching avoids computing the same path again.

5. Graphical Representation

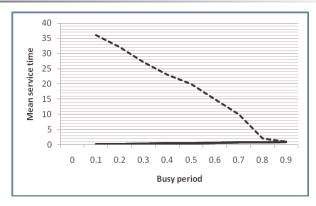


Figure 2

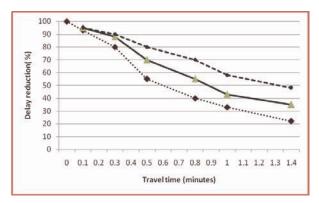


Figure 3

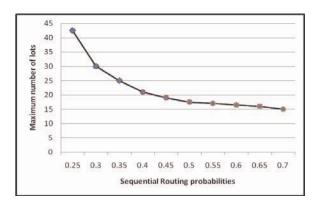


Figure 4

6. Conclusion

QoS routing is a main component of a reckoning structure. The scalability network is the challenging issue in the environment of large networks. In this paper, a new concept is introduced for seclusion using stochastic seclusion to reduce reckoning effort to find a path. The stochastic seclusion technique is to maximizing the scalability and

minimizing the complexity in large networks. Graphical representation shows that the stochastic seclusion speed up the routing functions.

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