Traffic Engineering towards the Assurance of Quality in IP networks: Trends and Perspectives

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Abstract

The need for establishing bandwidth guaranteed paths in IP networks and the requirement for making optimal use of the available resources becomes more and more crucial due to the significant development of data-intensive multimedia applications. In this paper, we discuss the techniques and the mechanisms for exercising traffic engineering in contemporary IP networks under the prism of exploiting historical monitoring information collected from the operational environment. Current state of the art and leading directions in the area of traffic engineering are presented in relation to the architectures and protocols that lay the foundation for building the commercial Internet. Issues that can lend insight into the route determination process such as the type of data to be monitored, are discussed along with the difficulties and limitations encountered in obtaining a traffic matrix. Our claims are substantiated through a set of simulation experiments conducted. In conclusion, we provide some directives on the deployment of a history aware traffic engineering mechanism, and report on issues that need to be taken into consideration.

Keywords*: Traffic engineering, history monitoring information, traffic matrix, QoS.*

1 Introduction

As Internet evolves into a standard communications network with emerging real time applications, such as voice and video, new techniques must be introduced for the management of the available assets. This need is enhanced by the fact that priceless network resources are not abundant. At one extreme, customers are willing to pay enough in order to enjoy the high quality services they desire. At the other extreme, ISPs, in their effort to overpower competitors, aim at utilizing their network infrastructures in a more economical way so as to increase the potential for accommodating future demands. To meet both users' and ISPs requirements, a balance between these two extremities must be reached. That is where the impetus for enforcing Traffic Engineering (TE) lies.

The fundamental goal of Traffic Engineering is to run the network efficiently at both traffic and resource levels. It is the framework that deals with the issue of performance evaluation and optimization. Thus, traffic engineering implies several ranges of objectives, including cost minimization, congestion avoidance, load balancing, multi-path routing, preempting and network survivability. Basically, traffic demands, collected requirements, imposed constraints

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