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D. Awduche  
J. Malcolm  
J. Agogbua  
M. O'Dell  
J. McManus  
UUNET (MCI Worldcom)  
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## Requirements for Traffic Engineering Over MPLS

### Status of this Memo

This memo provides information for the Internet community. It does not specify an Internet standard of any kind. Distribution of this memo is unlimited.

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### Abstract

This document presents a set of requirements for Traffic Engineering over Multiprotocol Label Switching (MPLS). It identifies the functional capabilities required to implement policies that facilitate efficient and reliable network operations in an MPLS domain. These capabilities can be used to optimize the utilization of network resources and to enhance traffic oriented performance characteristics.

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## 1.0 Introduction

Multiprotocol Label Switching (MPLS) [1,2] integrates a label swapping framework with network layer routing. The basic idea involves assigning short fixed length labels to packets at the ingress to an MPLS cloud (based on the concept of forwarding equivalence classes [1,2]). Throughout the interior of the MPLS domain, the labels attached to packets are used to make forwarding decisions (usually without recourse to the original packet headers).

A set of powerful constructs to address many critical issues in the emerging differentiated services Internet can be devised from this relatively simple paradigm. One of the most significant initial applications of MPLS will be in Traffic Engineering. The importance of this application is already well-recognized (see [1,2,3]).

This manuscript is exclusively focused on the Traffic Engineering applications of MPLS. Specifically, the goal of this document is to highlight the issues and requirements for Traffic Engineering in a large Internet backbone. The expectation is that the MPLS specifications, or implementations derived therefrom, will address



the realization of these objectives. A description of the basic capabilities and functionality required of an MPLS implementation to accommodate the requirements is also presented.

It should be noted that even though the focus is on Internet backbones, the capabilities described in this document are equally applicable to Traffic Engineering in enterprise networks. In general, the capabilities can be applied to any label switched network under a single technical administration in which at least two paths exist between two nodes.

Some recent manuscripts have focused on the considerations pertaining to Traffic Engineering and Traffic management under MPLS, most notably the works of Li and Rekhter [3], and others. In [3], an architecture is proposed which employs MPLS and RSVP to provide scalable differentiated services and Traffic Engineering in the Internet. The present manuscript complements the aforementioned and similar efforts. It reflects the authors' operational experience in managing a large Internet backbone.

## 1.1 Terminology

The reader is assumed to be familiar with the MPLS terminology as defined in [1].

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in RFC 2119 [11].

## 1.2 Document Organization

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