

MPLS Traffic Engineering

Feature Overview

Multiprotocol Label Switching (MPLS) traffic engineering software enables an MPLS backbone to replicate and expand upon the traffic engineering capabilities of Layer 2 ATM and Frame Relay networks.

Traffic engineering is essential for service provider and Internet service provider (ISP) backbones. Such backbones must support a high use of transmission capacity, and the networks must be very resilient, so that they can withstand link or node failures.

MPLS traffic engineering provides an integrated approach to traffic engineering. With MPLS, traffic engineering capabilities are integrated into Layer 3, which optimizes the routing of IP traffic, given the constraints imposed by backbone capacity and topology.

MPLS traffic engineering:

- Enhances standard IGPs, such as IS-IS or OSPF, to automatically map packets onto the appropriate traffic flows.
- Transports traffic flows across a network using MPLS forwarding.
- Determines the routes for traffic flows across a network based on the resources the traffic flow requires and the resources available in the network.
- Employs "constraint-based routing," in which the path for a traffic flow is the shortest path that meets the resource requirements (constraints) of the traffic flow. In MPLS traffic engineering, the traffic flow has bandwidth requirements, media requirements, a priority versus other flows, and so on.
- Recovers to link or node failures that change the topology of the backbone by adapting to a new set of constraints.

Why Use MPLS Traffic Engineering?

WAN connections are an expensive item in an ISP budget. Traffic engineering enables ISPs to route network traffic to offer the best service to their users in terms of throughput and delay. By making the service provider more efficient, traffic engineering reduces the cost of the network.

Currently, some ISPs base their services on an overlay model. In the overlay model, transmission facilities are managed by Layer 2 switching. The routers see only a fully meshed virtual topology, making most destinations appear one hop away. If you use the explicit Layer 2 transit layer, you can precisely control the ways in which traffic uses available bandwidth. However, the overlay model

Traffic Engineering With Mpls Traffic Engineering With Mpls

Vivek Alwayn



Traffic Engineering With Mpls Traffic Engineering With Mpls:

Traffic Engineering with MPLS Eric D. Osborne, Ajay Simha, 2002 Design configure and manage MPLS TE to optimize network performance Almost every busy network backbone has some congested links while others remain underutilized That s because shortest path routing protocols send traffic down the path that is shortest without considering other network parameters such as utilization and traffic demands Using Traffic Engineering TE network operators can redistribute packet flows to attain more uniform distribution across all links Forcing traffic onto specific pathways allows you to get the most out of your existing network capacity while making it easier to deliver consistent service levels to customers at the same time Cisco r Multiprotocol Label Switching MPLS lends efficiency to very large networks and is the most effective way to implement TE MPLS TE routes traffic flows across the network by aligning resources required by a given flow with actual backbone capacity and topology This constraint based routing approach feeds the network route traffic down one or more pathways preventing unexpected congestion and enabling recovery from link or node failures Traffic Engineering with MPLS provides you with information on how to use MPLS TE and associated features to maximize network bandwidth This book focuses on real world applications from design scenarios to feature configurations to tools that can be used in managing and troubleshooting MPLS TE Assuming some familiarity with basic label operations this guide focuses mainly on the operational aspects of MPLS TE how the various pieces work and how to configure and troubleshoot them Additionally this book addresses design and scalability issues along with extensive deployment tips to help you roll out MPLS TE on your own network Understand the background of TE and MPLS and brush up on MPLS forwarding basics Learn about router information distribution and how to bring up MPLS TE tunnels in a network Understand MPLS TE s Constrained Shortest Path First CSPF and mechanisms you can use to influence CSPF s path calculation Use the Resource Reservation Protocol RSVP to implement Label Switched Path setup Use various mechanisms to forward traffic down a tunnel Integrate MPLS into the IP quality of service QoS spectrum of services Utilize Fast Reroute FRR to mitigate packet loss associated with link and node failures Understand Simple Network Management Protocol SNMP based measurement and accounting services that are available for MPLS Evaluate design scenarios for scalable MPLS TE deployments Manage MPLS TE networks by examining common configuration mistakes and utilizing tools for troubleshooting MPLS TE problems Eric and Ajay work in the development group at Cisco that built Traffic Engineering They are among those with the greatest hands on experience with this application This book is the product of their experience George Swallow Cisco Systems Architect for Traffic Engineering Co Chair IETF MPLS Working Group Eric Osborne CCIE r 4122 has been doing Internet engineering of one sort or another since 1995 He joined Cisco in 1998 to work in the Cisco Technical Assistance Center TAC moved from there to the ISP Expert team and then to the MPLS Deployment team He has been involved in MPLS since the Cisco IOS r Software Release 11 1CT days Ajay Simha CCIE 2970 joined the Cisco TAC in 1996 He then went on to support tier 1 and 2 ISPs as part of Cisco s ISP

Expert team Ajay has been working as an MPLS deployment engineer since October 1999 and he has first hand experience in troubleshooting designing and deploying MPLS

QoS for IP/MPLS Networks Santiago Alvarez, 2006-06-02 A comprehensive guide to implementing QoS in IP MPLS networks using Cisco IOS and Cisco IOS XR Software Understand IP QoS architectures and how they apply to MPLS Take a detailed look at traffic management using policing shaping scheduling and active queue management Study Cisco QoS behavioral model and the modular QoS command line interface MQC Learn the operation of MPLS TE with its DiffServ extensions and applicability as a traffic protection alternative Find multiple configuration and verification examples illustrating the implementation of MPLS TE DS TE and FRR Review the different designs ranging from a best effort backbone to the most elaborate scenarios combining DiffServ DS TE and FRR Quality of service QoS plays a key role in the implementation of IP and MPLS networks today However QoS can be one of the most complex aspects of networking The industry efforts to achieve convergence have generated a need for increased levels of traffic differentiation Today s networks need to meet an array of QoS requirements to support distinct applications such as voice video and data and multiple network services such as IP Ethernet and ATM on a single converged multiservice network QoS has therefore become an integral part of network design implementation and operation QoS for IP MPLS Networks is a practical guide that will help you facilitate the design deployment and operation of QoS using Cisco IOS Software and Cisco IOS XR Software The book provides a thorough explanation of the technology behind MPLS QoS and related technologies including the different design options you can use to build an MPLS network with strict performance requirements This book discusses MPLS Traffic Engineering MPLS TE as a tool to complement MPLS QoS and enhance the performance characteristics of the network You ll learn technology configuration and operational details including the essentials facts about the behavior and configuration of the rich MPLS QoS and related MPLS TE functionality To get the most out of this book you should have a basic understanding of both IP and MPLS including the basics of IP addressing and routing and the basics of MPLS forwarding

Traffic Engineering in MPLS Networks Using RSVP-TE Arthi R. Ayyangar, 2000 *Efficient Bandwidth Guaranteed Routing for MPLS Traffic Engineering* Xu Su, 2002 [Traffic Engineering Using MPLS](#) Nirmaljeet Singh Mahl, 2004 *Multiprotocol Label Switching (MPLS) Traffic Engineering* Vivek Prabhakar, 2002

Traffic Engineering and QoS Optimization of Integrated Voice and Data Networks Gerald R. Ash, 2006-11-03 This book describes analyzes and recommends traffic engineering TE and quality of service QoS optimization methods for integrated voice data dynamic routing networks These functions control a network s response to traffic demands and other stimuli such as link failures or node failures TE and QoS optimization is concerned with measurement modeling characterization and control of network traffic and the application of techniques to achieve specific performance objectives The scope of the analysis and recommendations include dimensioning call flow and connection routing QoS resource management routing table management dynamic transport routing and operational requirements Case studies are included

which provide the reader with a concrete way into the technical details and highlight why and how to use the techniques described in the book Includes Case Studies of MPLS and GMPLS Network Optimization Presents state of the art traffic engineering and quality of service optimization methods and illustrates the tradeoffs between the various methods discussed Contains practical Case Studies based on large scale service provider implementations and architecture plans Written by a highly respected and well known active expert in traffic engineering and quality of service

Traffic Engineering in MPLS Networks with Multiple Objectives Selin Kardelen Cerav-Erbas,2004

Advanced MPLS Design and Implementation Vivek Alwayn,2001 An in depth guide to understanding advanced MPLS implementation including packet based VPNs ATM based VPNs traffic engineering and quality of service Advanced MPLS Design and Implementation enables you to Understand MPLS through a detailed analysis of MPLS architecture and operation Design and implement packet based MPLS Virtual Private Networks VPNs using label switching routers LSRs Design and implement ATM based MPLS VPNs using WAN switched ATM LSRs Implement MPLS traffic engineering on your core network and optimize traffic flows dynamically Implement MPLS QoS and provide hard service guarantees with multiple classes of service Acquire practical design and implementation knowledge of real world MPLS VPNs TE and QoS through case studies and configuration examples Multiprotocol Label Switching MPLS is a highly scalable high performance forwarding technology that has multiple applications in the service provider and enterprise environment This book is intended for internetwork engineers and administrators who are responsible for designing implementing and supporting service provider or enterprise MPLS backbone networks It contains a broad range of technical details on MPLS and its associated protocols packet based MPLS ATM based MPLS MPLS traffic engineering MPLS QoS MPLS design and advanced MPLS architectures This book contains MPLS theory design configuration and various case studies Use this book as a reference and guide for designing implementing and supporting an MPLS network Even if you re not using Cisco r equipment this book can increase your awareness and understanding of MPLS technology as well as provide you with detailed design concepts and rules for building scalable MPLS networks Advanced MPLS Design and Implementation is your guide to understanding designing and implementing MPLS VPNs WAN switched MPLS VPNs MPLS traffic engineering and MPLS QoS

Traffic Analysis of Mpls and Non Mpls Network Mahesh Kumar Porwal,2011-02 Multi Protocol Label Switching MPLS is rapidly emerging technology which plays a key role in next generation networks by delivering QoS and traffic engineering TE features MPLS is helpful in managing traffic when some links or paths are under and or over utilized Traffic engineering is the main strength of MPLS Where an IP based network is connectionless MPLS based network defines definite paths for network traffic based on some Quality of Service level In MPLS a look up in switching table is certainly less complex and less time consuming than a corresponding routing table look up in an IP router This book presents an analysis of MPLS signaling protocols for traffic engineering and shows the capability of providing traffic engineering in MPLS compared to the conventional routing protocol

and also explains the MPLS LSR operations based on the basic LSR functionality of classification queue and scheduling After comparative analysis of MPLS and non MPLS network it shows that MPLS provides improved network performance for heavy traffic environments This is useful to professionals and researcher who are working on MPLS networks

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