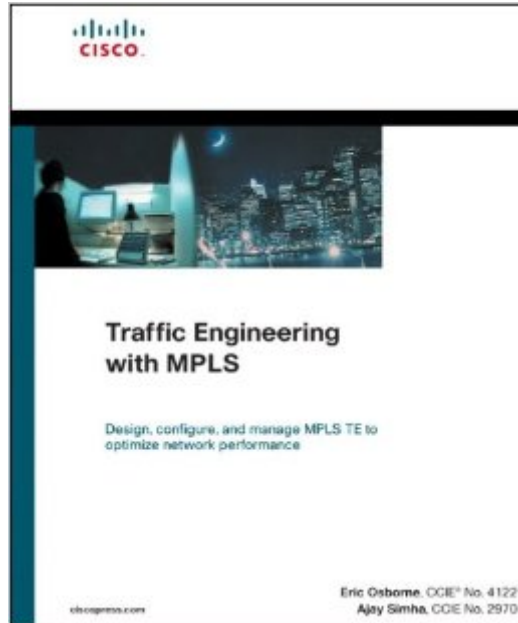


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# Traffic Engineering With MPLS (Networking Technology)



## Synopsis

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

EngineeringCo-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.

## **Book Information**

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## **Customer Reviews**

Very well written and with sufficient depth. I particularly like Chapter 9 (Network Design with MPLS TE) & 10 (MPLS TE Deployment Tips). However, most of the MPLS networks deployed have MPLS VPN service, if the authors have a case study or deployment considerations on MPLS VPN with MPLS TE, this book would be really great. On the whole, i strongly recommend this book for those

who want to learn MPLS TE in Cisco platform. Ajay & Eric, thanks for sharing your knowledge with us and keep up the good work !! :)

For Internet backbone engineers, and those who wish to be, Traffic Engineering, or TE is a key skill. From my experience there is no greater expert in this area than Eric Osborne. This book is a great way for MPLS novice's to learn and add to their skills, and an essential "bookshelf" reference for any experienced network engineers. With an easy style, and a clear and concise manner, Eric and his co-author, Ajay Simha, provide a realistic guide to MPLS TE, including RSVP, SNMP, and troubleshooting. Unlike many similar works, it is clearly grounded in the reality of large networks, rather than theoretical vendor simulations. Eric and Ajay are right up there with Khalid Raza, Bruce Caslow, and Jeff Doyle, in terms of the "essential" authors. Highly recommended!

Information Overload! The authors Eric Osborne and co-author Ajay Simha are definitely traffic engineering gurus! I don't know where to start on this book. Ok first things first. If you haven't read MPLS and VPN Architectures or don't have a firm understanding of MPLS and MPLS VPN's this is not the book for you. It is however a great , great book if you actually know what you are reading!! I work for an ISP that is currently rolling out MPLS in the network, and my department will be doing customer support once implemented. I was hoping to get a vague understanding of traffic engineering concepts before the product was rolled out. Man was I wrong! I definitely think this book gives you a FIRM understanding of everything that is MPLS TE. I would say that it has definitely bought me up to speed on implementing tunnels and how IGP's and VPN's interact with TE. This is definitely going to be desktop reference for me for years to come. My favorite chapters in the book definitely have to be Chapter 9 (Network Design with MPLS TE) and Chapter 10 (MPLS TE deployment tips). There were some pretty good diagrams there that really put the whole thing together for me. As well as case studies and issues that you may run into when implementing MPLS TE. As with all Cisco books the reading is a little dry, but very technical. The second chapter that went over LDP was a little too in depth for my taste. I find it fascinating on how complex LDP actually is (chapter 2 is about 50 pages if I'm correct).

Traffic Engineering with MPLS (ISBN 1587050315) Eric Osborne, Ajay Simha As most CCIE's do, I ventured out in search of my next technical mastery. After reading the MPLS and VPN Architectures book from Cisco Press, I decided to venture onward into the Traffic Engineering aspect of MPLS. WoW! There sure is a lot of information out there and this book does a good job on covering the in

depth details of the topic. I would however not recommend this book if you haven't read the first book mentioned as a primer/base for your MPLS knowledge because this one dives in deep very quickly. I work for a large service provider and we are designing a new MPLS based network to support several very large customers global networks therefore I need to be on top of the MPLS game. Not only does this book cover the MPLS TE concepts very well but also gets in to the tough areas of QOS such as RSVP, Diffserv and even into SPF! The chapters that I found the most rewarding were chapters 9 and 10 because not only are the diagrams easy to follow and apply to the topic at hand but they discuss the "knobs" that's be tweaked to make MPLS do exactly as you want it to which is the goal of this book. This book also covers topics such as IS-IS, Multicast routing, LDP-TDP, and the innards of MPLS as well as TE.

This book was extremely clear and dramatically increased my understanding on the topic. I often re-read it and still continue to deepen my understanding of the topic. I purchased the kindle edition but I wished that I had purchased the hard back, it's that good. I normally only say the W. Odom books from Cisco Press are this good, but I'll have to add this author to that short list of excellent tech authors! well done.

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