# Advanced MPLS VPN Configuration and Troubleshooting Training Course



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LONDON

5900 € (Per Person)

Ref: #NO2206_118007

## Course Introduction / Overview:

This comprehensive training course provides an in-depth exploration of Multiprotocol Label Switching (MPLS) Virtual Private Networks (VPNs), from fundamental principles to advanced configuration and troubleshooting techniques. In today's interconnected world, MPLS remains the backbone for service providers and large enterprises, offering scalable, secure, and high-performance connectivity. This course demystifies the complexities of both Layer 3 and Layer 2 VPNs, equipping participants with the practical skills needed to design, implement, and maintain robust MPLS infrastructures. Drawing on industry best practices and concepts discussed by leading experts like Ivan Pepelnjak, we delve into the core components such as Label Distribution Protocol (LDP), Border Gateway Protocol (BGP) for VPNs, and the critical roles of Route Distinguishers and Route Targets. Participants will move beyond basic theory, engaging with real-world scenarios inspired by challenges detailed in texts like "MPLS-Enabled Applications". BIG BEN Training Center has designed this program to be intensely practical, ensuring that upon completion, attendees can confidently tackle complex MPLS VPN issues, optimize network performance with Traffic Engineering and QoS, and manage large-scale deployments effectively. This is the definitive training for mastering MPLS VPNs from A to Z.

## Target Audience / This training course is suitable for:

- Network Engineers and Administrators.
- Network Architects and Designers.
- Service Provider Network Operations Staff.
- Enterprise IT Professionals managing WANs.
- Network Operations Center (NOC) Technicians.
- Systems Engineers involved in network infrastructure.
- IP/MPLS Support and Implementation Engineers.
- Technical professionals seeking advanced networking skills.

## Target Sectors and Industries:

- Telecommunications and Internet Service Providers (ISPs).
- Cloud and Data Center Service Providers.
- Financial Services and Banking Institutions.
- Large Multinational Corporations.
- Government Agencies and Public Sector Organizations.
- Healthcare and Pharmaceutical Industries.
- Energy and Utilities Sector.
- Technology and Software Development Companies.

## Target Organizations Departments:

- Network Operations and Engineering.
- IT Infrastructure and Architecture.
- Cybersecurity and Network Security.
- Technical Support and Service Desk.
- Cloud Services and Virtualization.
- Research and Development (R&D).
- Data Center Management.
- Service Provisioning and Implementation.

## Course Offerings:

By the end of this course, the participants will have able to:

- Design and implement scalable Layer 3 MPLS VPNs in enterprise and service provider networks.
- Configure and verify complex PE-CE routing protocols including BGP, OSPF, and EIGRP.
- Master the concepts of Route Distinguishers (RDs) and Route Targets (RTs) for VPN policy control.
- Deploy and troubleshoot various Layer 2 VPN technologies such as VPLS and AToM.
- Implement MPLS Traffic Engineering (TE) to optimize network resource utilization and path selection.
- Apply Quality of Service (QoS) mechanisms within an MPLS core to prioritize critical traffic.
- Troubleshoot common MPLS VPN connectivity, routing, and performance issues effectively.
- Analyze and resolve complex inter-AS VPN and Carrier Supporting Carrier (CSC) scenarios.
- Utilize MPLS Operations, Administration, and Maintenance (OAM) tools for proactive network monitoring.
- Develop a systematic approach to diagnosing and resolving intricate MPLS network faults.

## Course Methodology:

The training methodology at BIG BEN Training Center is designed for maximum knowledge retention and practical application. This course moves beyond traditional lectures to create a fully immersive and interactive learning environment. Each day combines expert-led instruction with intensive, hands-on lab sessions that allow participants to configure and troubleshoot MPLS VPNs in a simulated, real-world network environment. We utilize a blend of case studies derived from actual network incidents, encouraging participants to analyze problems, collaborate on solutions, and present their findings. Group discussions and brainstorming sessions are integral, fostering a collaborative atmosphere where attendees can share experiences and learn from one another. Our instructors facilitate these sessions, providing personalized feedback and guiding participants through complex technical challenges. The curriculum emphasizes a problem-solving approach, ensuring that theoretical concepts are immediately reinforced with practical tasks. This dynamic mix of theory, application, and peer-to-peer interaction ensures that participants not only understand the "how" but also the "why" behind advanced MPLS VPN technologies.

# Course Agenda (Course Units):

## Unit One: MPLS Fundamentals and L3VPN Core Concepts

- Introduction to MPLS architecture and terminology.
- Label Distribution Protocol (LDP) operation and configuration.
- Understanding the MPLS forwarding process (LSR, LER).
- Introduction to MPLS Layer 3 VPNs.
- VRF (VPN Routing and Forwarding) instances explained.
- The role of Route Distinguishers (RDs) and Route Targets (RTs).
- Configuring and verifying a basic L3VPN with static and RIP routing.

## Unit Two: Advanced L3VPN Configuration and PE-CE Routing

- Configuring OSPF as a PE-CE routing protocol.
- Implementing EIGRP between PE and CE routers.
- Using BGP as the PE-CE routing protocol for scalability.
- Providing Internet access from within an MPLS VPN.
- Exploring complex hub-and-spoke and full-mesh VPN topologies.
- Understanding Inter-AS MPLS VPNs (Option A, B, and C).
- Introduction to Carrier Supporting Carrier (CSC) concepts.

## Unit Three: MPLS Layer 2 VPN Technologies

- Introduction to Layer 2 VPNs over MPLS.
- Any Transport over MPLS (AToM) for point-to-point services.
- Configuring and troubleshooting Ethernet over MPLS (EoMPLS).
- Virtual Private LAN Service (VPLS) for multipoint L2 connectivity.
- Understanding VPLS signaling and forwarding mechanisms.
- Hierarchical VPLS (H-VPLS) for improved scalability.
- An overview of next-generation EVPN concepts.

## Unit Four: MPLS Traffic Engineering and Quality of Service

- Fundamentals of MPLS Traffic Engineering (TE).
- Configuring and verifying MPLS TE tunnels.
- Implementing Fast Reroute (FRR) for high availability.
- Introduction to Quality of Service (QoS) in IP networks.
- Implementing QoS within the MPLS core.
- Differentiated Services (DiffServ) and MPLS EXP bits.
- Applying marking, policing, and shaping policies for VPN traffic.

## Unit Five: Advanced MPLS Troubleshooting and Management

- Developing a systematic MPLS troubleshooting methodology.
- Using essential verification and debugging commands.
- Leveraging MPLS Operations, Administration, and Maintenance (OAM) tools.
- Troubleshooting common L3VPN routing and connectivity issues.
- Diagnosing and resolving L2VPN forwarding problems.
- Analyzing complex failure scenarios through practical case studies.
- Best practices for monitoring and maintaining an MPLS network.

# FAQ:

### Qualifications required for registering to this course?

There are no requirements.

### How long is each daily session, and what is the total number of training hours for the course?

This training course spans five days, with daily sessions ranging between 4 to 5 hours, including breaks and interactive activities, bringing the total duration to 20 - 25 training hours.

## Something to think about:

As SD-WAN adoption grows, how does the role of MPLS evolve from a primary transport to a high-performance underlay, and what new troubleshooting complexities does this hybrid model introduce?

## What unique qualities does this course offer compared to other courses?

This course distinguishes itself by focusing intensely on the practical, real-world application of MPLS VPN technologies rather than just theoretical knowledge. While many courses cover the basics, we delve into the complex troubleshooting scenarios that network professionals face daily. Our curriculum is built around a series of progressively challenging hands-on labs that simulate enterprise and service provider networks, forcing participants to diagnose and resolve issues related to PE-CE routing, Inter-AS connectivity, and L2VPN failures. We emphasize a deep understanding of the control plane and data plane interactions, enabling participants to predict network behavior and prevent outages. Furthermore, the course provides comprehensive coverage of both Layer 3 and Layer 2 VPNs, along with advanced topics like Traffic Engineering and QoS, which are often treated superficially elsewhere. This holistic approach ensures that graduates are not just certified but are truly competent, equipped with a systematic troubleshooting methodology and the confidence to manage and scale complex, mission-critical MPLS infrastructures effectively. The insights gained here are directly transferable to the workplace, providing immediate value to both the participant and their organization.