

# VOIP in MPLS Networks

## Two Trend Technologies Combined

Even if there is no direct connection between MPLS and QoS from the technical viewpoint: It is a fact that almost all MPLS networks have been and continue to be equipped with notable quality of service features. One of the central real-time applications for the utilization of this quality of service is the implementation of voice over IP/IP telephony in MPLS networks. The available product range of ISPs extends from pure transport services for real-time data over VoIP-capable VPNs to a complete IP telephony service, where the customer only requires the end devices. The course will enable the participants to integrate voice solutions on the basis of voice-over-IP over an MPLS network. This includes the pure transport of voice over the data network up to the complete scope of performance of a voice network operator on an MPLS platform.

### Course Contents

- MPLS Concepts and Trunk Protocols
- Voice over IP (VoIP) and IP Telephony
- VoIP Signaling: SIP, H.323, MGCP
- The Soft Switch in the MPLS Network
- Gateways into the PSTN
- Quality of Service: 802.1p/Q, QoS for VoIP with MPLS, MPLS with DiffServ
- End-to-End QoS and Mapping
- Appropriate MPLS-VPN Concepts for VoIP/IP Telephony
- Central Service VPN (CS-VPN) for VoIP/IP Telephony

In this course of the ExperTeach Networking series, each student will receive the comprehensive ExperTeach course documentation.

### Target Group

The course addresses designers and operators of MPLS networks who wish to implement and optimize integrated voice-over-IP solutions.

### Knowledge Prerequisites

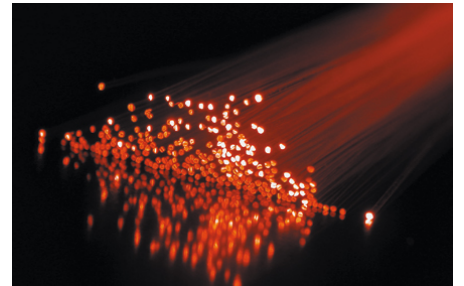
A profound knowledge in the fields of IP and IP routing is required. A good basic know-how in the sectors MPLS and voice-over-IP will be helpful, but is not mandatory.



### Reservation and Registration

We will be glad to make a free and non-binding course reservation for you for the duration of two weeks. On [www.experteach-benelux.com](http://www.experteach-benelux.com) under *Registration*, you can conveniently make course reservations, registrations, and hotel reservations. Alternatively, call us under +31 (0)76 52 32 950.

For closed groups of participants, we can modify the course contents according to your requirements. Do not hesitate to contact us!



3 days €1,695 exclusive of V.A.T.

### Course date (dd.mm.yy)/Location

Course dates available on request

Up-to-date information: [www.experteach-benelux.com](http://www.experteach-benelux.com) MPVO



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<p><b>1 Motivation</b></p> <p>1.1 Present Voice Networks</p> <p>1.1.1 Carrier PSTNs</p> <p>1.1.2 Virtual Private Networks (VPNs)</p> <p>1.1.3 Cellular Networks</p> <p>1.1.4 Enterprise Networks</p> <p>1.1.5 Voice over IP</p> <p>1.2 Motivation of Packetized Voice Transmission</p> <p>1.3 The MPLS Concept</p> <p>1.3.1 IP Overlay Models—Scalability</p> <p>1.3.2 Sophisticated Requirements—Traffic Engineering</p> <p>1.3.3 Transit Services—Tunneling</p> <p><b>2 Voice in MPLS Networks</b></p> <p>2.1 Voice-over-MPLS Solutions</p> <p>2.2 Voice over IP over MPLS</p> <p>2.3 TDM over MPLS</p> <p>2.4 Voice over MPLS</p> <p>2.5 Trunking over ATM</p> <p>2.6 Voice over ATM over MPLS</p> <p><b>3 Payload Data with Voice over IP</b></p> <p>3.1 Real-Time Applications over IP—The Mechanisms</p> <p>3.1.1 RTP—Transport and Reconstruction Function</p> <p>3.1.2 RTCP—Information on RTP Connections</p> <p>3.2 rRTP—Header Compression on the Trunk</p> <p>3.3 Bandwidths for VoIP</p> <p><b>4 Signaling with VoIP</b></p> <p>4.1 VoIP Concepts in an Overview</p> <p>4.1.1 H.323</p> <p>4.1.2 Megaco/H.248</p> <p>4.1.3 SIP</p> <p>4.2 The H.323 Architecture</p> <p>4.2.1 H.323 Terminal—The Functions of the End Devices</p> <p>4.2.2 H.323 Gateway—The Translator</p> <p>4.2.3 H.323 Gatekeeper—Address Translation and Management</p> <p>4.2.4 H.323 MCU—Management of Conference Calls</p> <p>4.3 Signaling</p> <p>4.3.1 Addressing—Multifarious but Unambiguous</p> <p>4.3.2 RAS—Gatekeeper End-Point Communication</p> <p>4.3.3 The Phases of a Call</p> <p>4.3.4 A Complete Call</p> <p>4.3.5 H.323 Procedures in the TCP/IP Protocol Stack</p> <p><b>5 MPLS Concepts</b></p> <p>5.1 On Rails through the Network: Label Switched Paths</p>	<p>5.1.1 IP Routing</p> <p>5.1.2 The Label under Scrutiny</p> <p>5.1.3 Forwarding Information Base</p> <p>5.2 Label Distribution</p> <p>5.2.1 Label Distribution Protocol</p> <p>5.2.2 Unsolicited Downstream: Unsolicited Distribution</p> <p>5.2.3 Downstream on Demand: Labels on Demand</p> <p>5.2.4 Further Label Distribution Mechanisms</p> <p>5.3 Routing Protocols in the IP World</p> <p>5.3.1 The Recommended IGP: OSPF</p> <p>5.3.2 The Trend in Provider Networks: IS-IS</p> <p>5.3.3 Basic Features of BGP-4</p> <p>5.3.4 Transport of Transit Traffic with MPLS</p> <p><b>6 Quality of Service in the MPLS Network</b></p> <p>6.1 Queuing</p> <p>6.1.1 The Three Basic Questions</p> <p>6.1.2 In Which Queue?</p> <p>6.1.3 Which Packets Have to be Discarded?</p> <p>6.1.4 When Will Packets be Sent?</p> <p>6.2 QoS Models</p> <p>6.2.1 Hose Model</p> <p>6.2.2 Pipe Model</p> <p>6.3 MPLS with DiffServ</p> <p>6.3.1 TOS vs. DiffServ</p> <p>6.3.2 LSRs and DiffServ</p> <p>6.3.3 Classes of Service and DiffServ</p> <p>6.4 MPLS with IntServ</p> <p>6.4.1 RSVP and Scalability</p> <p>6.4.2 Traffic Engineering via MPLS</p> <p>6.5 QoS in the VLAN</p> <p><b>7 VPNs for Voice over IP</b></p> <p>7.1 VPNs</p> <p>7.1.1 VPNs with MPLS and BGP-4</p> <p>7.1.2 The VoIP VPN—A Closed User Group</p> <p>7.1.3 The Central Service VPN for VoIP</p> <p>7.2 Special Issues</p> <p>7.2.1 Call Admission Control</p> <p>7.2.2 Gateways into Other Voice Networks</p> <p>7.2.3 Tariffing and CDRs</p> <p><b>A Details</b></p> <p>A.1 The Test Network</p> <p><b>B List of Abbreviations</b></p>
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