



# Exploring IP Routing and Ethernet Bridging

**IPC\_207 | Expert-Led Live | Transport | Expert**

**Course Duration:** 2 days

IP Convergence is the key enabler for wireless, wire-line, cable and enterprise networks of the future. In-depth understanding of Interconnection of IP and Ethernet networks is essential for those designing, operating and monitoring large complex carrier networks. This course focuses on technologies and protocols used to connect different IP networks and Ethernet LAN segments to create large and complex IP networks using both Ethernet switching (Layer 2) and IP/MPLS routing (Layer 3). The course covers IP routing Protocols such as OSPF and BGPv4, as well as Ethernet bridging protocols STP, RSTP, MSTP and PVSTP+. In addition, the use of MPLS to interconnect networks through Layer 3 Virtual Private Networks (L3VPN) is covered in the course.

## Intended Audience

This course is intended for those who are engaged in planning, operating and monitoring complex IP/Ethernet networks.

## Objectives

After completing this course, the learner will be able to:

- Sketch/configure Ethernet bridging solutions with L2 protocols such as MSTP
- Implement L2 redundancy using MSTP
- Explain IP routing concepts
- Implement basic multi-area OSPF routed networks
- Detail the functions and the usage of the BGPv4 protocol
- Implement BGP routed VPN solution
- Isolate routing amongst different VRFs
- List and explain key routing issues

## Outline

1. Prologue
  - 1.1 Routing and switching in 4G – an end-to-end view
  - 1.2 The lab configuration
2. Spanning Tree Protocol
  - 2.1 Concepts
  - 2.2 Rapid STP (RSTP)
  - 2.3 Multiple STP (MSTP)
3. The Routing Table
  - 3.1 How to read a routing table
  - 3.2 Administrative distance
  - 3.3 Longest match rule
  - 3.4 Equal cost multiple path
  - 3.5 Recursive searches
  - 3.6 Troubleshooting black holes
  - 3.7 Redistribution
4. OSPF Key Concepts
  - 4.1 OSPF areas
  - 4.2 Router types
  - 4.3 Link state advertisements
5. OSPF in Wireless Networks
  - 5.1 Neighbor discovery
  - 5.2 Adjacencies
  - 5.3 Database synchronization
  - 5.4 End-to-end scenarios
  - 5.5 Route propagation
  - 5.6 Traffic flows
6. BGPv4 Key Concepts
  - 6.1 iBGP and eBGP
  - 6.2 Route reflectors
  - 6.3 Confederations
7. BGPv4 in Wireless Networks
  - 7.1 Route manipulation using BGP attributes
  - 7.2 BGP communities
  - 7.3 BGP path determination
8. L3 VPNs in Wireless Networks
  - 8.1 Interconnecting MTSOs
  - 8.2 Architecture
  - 8.3 High level operations
9. L3VPN Routing
  - 9.1 Provider/customer model
  - 9.2 VPN Routing and Forwarding (VRF)
  - 9.3 VPN route distribution
  - 9.4 VPN-IPv4 address family
  - 9.5 Route distinguishers
  - 9.6 Route targets
10. Putting it all together
  - 10.1 End-to-end routing
  - 10.2 End-to-end traffic

