# Course : Cisco routers, advanced

**routing, OSPF, BGP, QoS, VPN, VoIP**

*Practical course - 5d - 35h00 - Ref. ROP*
*Price : 3330 CHF E.T.*

★★★★⯪ 4,4 / 5

This advanced course will help you master the concepts of distance vector, link state and path vector protocols, routing protocol selection criteria, the characteristics of RIP-2, EIGRP, OSPF and BGP, IP switching mechanisms, virtual private network design, Voice over IP and access security.

## Teaching objectives

**At the end of the training, the participant will be able to:**

- ✓ Understanding routing protocols
- ✓ Implementing an EIGRP IP network interconnection
- ✓ Creating a secure OSPF interconnection
- ✓ Implement an IP network interconnection using the BGP4 protocol
- ✓ Create an IPSec VPN virtual private network

## Intended audience
Anyone whose job requires knowledge of configuring routing protocols on Cisco routers.

## Prerequisites
Good knowledge of TCP/IP and Cisco router configuration. Or knowledge equivalent to that acquired in the course "Cisco routers, IP implementation" (ref. ROC).

## Practical details
**Hands-on work**
Discussions, experience-sharing, demonstrations, tutorials and case studies

**Teaching methods**
Active pedagogy based on examples, demonstrations, experience sharing, case studies and assessment of learning throughout the course.

## Course schedule

**PARTICIPANTS**
Anyone whose job requires knowledge of configuring routing protocols on Cisco routers.

**PREREQUISITES**
Good knowledge of TCP/IP and Cisco router configuration. Or knowledge equivalent to that acquired in the course "Cisco routers, IP implementation" (ref. ROC).

**TRAINER QUALIFICATIONS**
The experts leading the training are specialists in the covered subjects. They have been approved by our instructional teams for both their professional knowledge and their teaching ability, for each course they teach. They have at least five to ten years of experience in their field and hold (or have held) decision-making positions in companies.

**ASSESSMENT TERMS**
The trainer evaluates each participant's academic progress throughout the training using multiple choice, scenarios, hands-on work and more.
Participants also complete a placement test before and after the course to measure the skills they've developed.

## 1. Compare routing options

- Topology: tree or mesh.
- Prioritization: flat or backbone network.
- Services: prioritization or not.
- Flows: synchronous or asynchronous.
- Technical or strategic criteria: throughput, lead time, price or preference.

## 2. Distance vector routing

- The RIP 2 protocol.
- The simplicity of RIP. Loop handling. Convergence. Message handling.
- Subnet routing, security. Multicast broadcasting, SNMP administration.
- External route management, Next Hop. Authentication.
- The EIGRP protocol.
- Multiple metrics. Best path selection. Loop processing, Split Horizon. Poison Reverse. Convergence.
- DUAL broadcast update algorithm. Hello and RTP protocols. External route management.
- Feasable Distance Possible Successor. Neighborhood. Topology. Configure EIGRP.
- Implement load sharing. Operator action on route selection.
- Globalization or not of subnets. Routing filtering: access lists.
- Compare convergence between EIGRP and RIP2. Configure authentication.

### Hands-on work

RIP2 configuration commands on LAN, WAN. Validate limits. Implementing a network interconnection. Creating problems and debugging actions on RIP2. Implement EIGRP IP network interconnection. Implement load balancing.

## 3. Link-state routing

- Basic concepts. Database and topology. Link states.
- The OSPF protocol. Metrics and multiple paths: traffic distribution.
- The role of neighborhoods in rapid convergence.
- Hierarchical network with backbone and zones. The notion of designated router. Secure broadcasting of link status.
- Event-based updates. Network updates with or without broadcast.
- Define OSPF areas with or without globalization. Stub Area, Not So Stub Area, virtual link.
- Consequences for broadcasting. Backbone routing configuration, interzone, intrazone.
- Interpret database information. Customize link costs.
- Optimizing OSPF load. Traffic distribution.

### Hands-on work

Implement a secure OSPF interconnection. Creation of a hierarchical network and definition of OSPF areas, verification of backbone broadcasts and the impact of the notion of terminal area (stub area and NSSA) with or without route synthesis. OSPF debugging actions.

## ( 4 ) BGP path vector routing

- Definition. Autonomous systems. Topology, tables, loops, routes, political routing.
- Path vectors. Attributes. BGP procedures. Exchanges, updates, polling.
- Political routing processing.

**Hands-on work**
Implementation of an IP network interconnection using the BGP4 protocol. Set up a network of autonomous systems. Verification of backbone broadcasts. BGP debugging actions. Creation of a decision table.

## ( 5 ) Multicast routing

- Overview. Implementing multicast processing on Cisco.
- IGMP protocol on LAN. Dense and Sparse mode PIM protocol between routers.
- DVMRP and MOSPF protocols on the backbone.
- Cisco GMP between router and switch.

## ( 6 ) QoS - Flow prioritization

- Definition of requirements.
- DiffServ: flow marking: DSCP. Solutions: traffic shaping, queuing.
- Fair Queuing, Priority Queuing. Custom Queuing.

**Hands-on work**
Configure different types of queues. Validate impact on transfers.

## ( 7 ) Virtual Private Networks: VPN

- MPLS VPN. MPLS components. VPN architecture. Associating flows, labels and QoS.
- IPSec VPN. How it works. Algorithm selection.
- Road and tunnel association. Principles of implementation.

**Hands-on work**
IPSec tunnel creation. Encryption mechanisms. IPsec configuration. Verification. Debug actions.

## ( 8 ) The IS-IS protocol

- Presentation.
- Implementation and use.
- Comparison with OSPF.

**Hands-on work**
Example of the IS-IS protocol.

## Dates and locations

**REMOTE CLASS**
2026 : 15 June, 21 Sep.