Module IR.2401

Routing and Switching

Person in charge:
Prerequisite: Networks Fundamentals
Organization: Lectures 27h / Tutorials 16h
Evaluation: 2 written exams, Labs
ECTS: 5 credits

Context

After the module IR.1101 introducing the fundamental concepts related to computer networks, this course is devoted to the problems of switching and routing. First, at a local network level, it addresses the technologies and protocols needed for designing and implementing a switched network. Then, on a wider scale, it studies the routing of data across different networks by focusing on the role of routing protocols.

Objectives

Skills

In terms of skills, this module aims to enable students to:

- Configure switches to provide access to users on a local area network.
- Integrate wireless devices on a local area network.
- Configure of routing protocols on network devices.
- Identify and the solve network problems related to routing (Troubleshooting).

Knowledge

This module enables students to develop the following concepts and skills.

- **Concepts**
  - The characteristics of switched local area networks (based on Ethernet) and wireless networks (Wi-Fi).
  - The architecture and the engineering of IP networks, and more particularly the routing (identification of networks, routes' propagation).
- **Know-How**
  - Selecting the technology, the services and the WAN devices that better meet the changing needs of a company in growth.

- o Securing network equipment, services, and use the standard and extended access control lists (ACLs).
- o Setting up remote access for teleworking, using virtual private networks (VPNs).
- o Managing address space efficiently by using DHCP, NAT or through IPv6.
- o Configuring, managing and troubleshooting the virtual local network (VLANs) and the aggregations.
- o Using the STP protocols to solve the problem of loops in a network.
- o Identifying the components (standards, equipment) that are needed to build a wireless infrastructure.
- o Configuring a router, and understanding its routing table.
- o Designing and applying sub-networking schemes.
- o Identifying and implementing distance vector and link state routing that are currently used (RIP, RIPv2, OSPF, ...).

- **Keywords**
  - o Ethernet Switching, Virtual Local Area Network (VLAN), Spanning Tree, Wireless Local Area Network (Wi-Fi).
  - o Dynamic Routing (RIP, OSPF), Classless Addressing (VLSM, CIDR), Distance-Vector Routing Protocols, Link State Routing Protocols.

Pedagogical Approach

The content of this module is taught in the form of classical courses and practical work through Labs. It is based on the content of the "Cisco Academy" devoted to switching and routing (the "Routing & Switching Essentials" part of the Cisco CCNA certification).

The course will focus on the principles and protocols, rather than on the specific implementation made by Cisco (IOS). It is possible, however, for the students who wish to go further on the subject, to study these aspects using the exercises proposed online on Moodle (e-learning content of the "Cisco Academy").

References

- Routing and Switching Essentials Companion Guide, By Cisco Networking Academy, Published in 2014 by Cisco Press, Part of the Companion Guide series.
- Scaling Networks Companion Guide, By Cisco Networking Academy, Published in 2014 by Cisco Press. Part of the Companion Guide series.