INSTITUTO POLITÉCNICO DE BRAGANÇA

Course Unit	Communication Networks II			Field of study	Network and Computer Systems								
Bachelor in	Informatics and Communications			School	School of Public Management, Communication and Tourism								
Academic Year	2023/2024	Year of study	3	Level	1-3	ECTS credits	6.0						
Type	Semestral	Semester	1	Code	9188-320-3103-00-23								
Workload (hours)	162	Contact hours	T 15	TP -	PL 45	TC -	S -	E -	OT 20	O -			

T - Lectures; TP - Lectures and problem-solving; PL - Problem-solving, project or laboratory; TC - Fieldwork; S - Seminar; E - Placement; OT - Tutorial; O - Other

Name(s) of lecturer(s): João Pedro Carneiro Borges Gomes

Learning outcomes and competences

At the end of the course unit the learner is expected to be able to:
1. Configure VLANs and Inter-VLAN routing, applying security best practices.
2. Configure redundancy on a switched network using STP and EtherChannel.
3. Explain how to support available and reliable networks using dynamic addressing and first-hop redundancy protocols.
4. Configure dynamic address allocation in IPv4 and IPv6 networks.
5. Configure switch security to mitigate LAN attacks.
6. Configure WLANs using a WLC and L2 security best practices.
7. Configure IPv4 and IPv6 static routing on routers.

Prerequisites

Before the course unit the learner is expected to be able to:
1. understand the principles of communication networks;
2. understand the OSI reference model and the TCP/IP architecture;
3. plan the IP addressing of a network;
4. understand the Ethernet technologies.

Course contents

Switching and VLANs. Redundant networks. Available and Reliable Networks. Layer 2 Security. Wireless Networks. Routing Concepts and Configuration

Course contents (extended version)

1. Switching and VLANs
   - Basic device configuration (switch, router, secure remote access, connectivity)
   - Switching concepts (frame forwarding, switching domains)
   - VLANs (operation, configuration, trunks, DTP)
   - Routing between VLANs (operation, with router, with L3 switch, troubleshooting)
2. Redundant networks
   - STP (objective, operation, evolution)
   - EtherChannel (operation, configuration, troubleshooting)
3. Available and Reliable Networks
   - DHCPv4 (concepts, router configuration as a server and as a client)
   - SLAAC and DHCPv6 (IPv6, SLAAC, DHCPv6 address assignment, DHCPv6 server configuration)
   - FHRP (first hop redundancy protocols, HSRP)
4. Layer 2 Security
   - LAN security (security of switches and terminal devices, access control, threats, attacks)
   - Switch security configuration (security implementation, attack mitigation)
5. Wireless Networks
   - Wireless networks (introduction, components, operation, CAPWAP, channels, threats, security)
   - WLAN configuration (wireless router, WMN, WLC, WLAN enterprise, troubleshooting)
6. Routing Concepts and Configuration
   - IP routing concepts (tables, routes, static and dynamic routing)
   - Static IP routing (static routes, configuration of various types of static routes)
   - Troubleshooting static routes (package processing, configuration problems)

Recommended reading

1. Cisco Systems, Inc. (2021). CCNAv7: Switching, Routing, and Wireless Essentials. Disponível em https://netacad.com
2. Véstias, M. (2016). Redes Cisco - Para Profissionais (7. ª ed. atualizada). FCA. ISBN-13: 978-972-722-828-7
3. Empson, S. (2019). CCNA 200-301 Portable Command Guide 5th Edition. Cisco Press. ISBN-13: 978-0135937822
4. Gomes, J. P. (2021). Diapositivos de Redes de Comunicação II [Documentos PDF]. Disponível em https: //virtual. ipb. pt
5. Odom, W. (2019). CCNA 200-301 Official Cert Guide, Volume 1, 1st Edition. Cisco Press. ISBN-13: 978-0135792735

Teaching and learning methods

Lectures, demonstrations, case analysis and discussion, interactive multimedia activities, laboratorial activities, practical assignements, self guided learning, Will be used computer network laboratories, simulators and e-learning.

Assessment methods

1. Continuous Evaluation - (Regular, Student Worker) (Final)
   - Intermediate Written Test - 40% (Two tests. Alternative: Tests (20%) + Networking Academy (20%))
   - Projects - 60%
2. Final Evaluation - (Regular, Student Worker) (Supplementary, Special)
   - Final Written Exam - 40% (Alternative: Exam (20%) + Networking Academy (20%))
   - Projects - 60%

Language of instruction

Portuguese, with additional English support for foreign students.

Electronic validation

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13-10-2023	13-10-2023	13-10-2023	15-10-2023