Last update: 06-05-2019

230651 - OVNET - Overlay Networks

Coordinating unit: 230 - ETSETB - Barcelona School of Telecommunications Engineering

Teaching unit: 744 - ENTEL - Department of Network Engineering

Academic year: 2019

Degree: MASTER'S DEGREE IN TELECOMMUNICATIONS ENGINEERING (Syllabus 2013). (Teaching unit Compulsory)
MASTER'S DEGREE IN ADVANCED TELECOMMUNICATION TECHNOLOGIES (Syllabus 2019). (Teaching unit Optional)
MASTER'S DEGREE IN NETWORK ENGINEERING (Syllabus 2009). (Teaching unit Optional)
MASTER'S DEGREE IN INFORMATION AND COMMUNICATION TECHNOLOGIES (Syllabus 2009). (Teaching unit Optional)

ECTS credits: 5 Teaching languages: English

Teaching staff

Coordinator: OSCAR ESPARZA

Others: JOSÉ LUIS MUÑOZ, JUANJO ALINS, JORGE MATA

Prior skills

Skills to deal with Linux, networks and command line interface

Requirements

TCP/IP protocol suite
Firewall configuration
Linux networking

Degree competences to which the subject contributes

Specific:

1. Ability to deal with the convergence, interoperability and design of heterogeneous networks with local, access and core networks, as well as with service integration (telephony, data, television and interactive services).
2. Ability to design and dimension transport, broadcast and distribution networks for multimedia signals
3. Ability to model, design, implement, manage, operate, administrate and maintain networks, services and contents
4. Ability to plan networks and decision-making about services and applications taking into account: quality of service, operational and direct costs, implementation plan, supervision, security processes, scalability and maintenance. Ability to manage and assure the quality during the development process
5. Ability to understand and to know how to apply the functioning and organization of the Internet, new generation Internet technologies and protocols, component models, middleware and services

Transversal:

6. EFFECTIVE USE OF INFORMATION RESOURCES: Managing the acquisition, structuring, analysis and display of data and information in the chosen area of specialisation and critically assessing the results obtained.
7. FOREIGN LANGUAGE: Achieving a level of spoken and written proficiency in a foreign language, preferably English, that meets the needs of the profession and the labour market.

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Teaching methodology

Lectures
Laboratory classes
Short answer quizzes
Laboratory exam

Learning objectives of the subject

The aim of this course is to train students in the mechanisms and protocols needed to design and deploy overlay networks. We will introduce the basics of tunneling and multicast techniques, which are essential to the proper deployment of overlay-based multimedia services over the Internet. We will also introduce some example of overlays, like p2p (peer-to-peer), SIP (Session Initiation Protocol), CDN (Content Delivery Networks) and SDN (Software Defined Network).

Learning results of the subject:

- Ability to design and deploy overlay networks and more specifically, those that provide multimedia services over the Internet.
- Ability to use and analyze networks.
- Ability to understand the basic working of some existing overlay networks.

Study load

Total learning time: 125h	Hours large group:	26h	20.80%
	Hours medium group:	0h	0.00%
	Hours small group:	13h	10.40%
	Guided activities:	0h	0.00%
	Self study:	86h	68.80%

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Content

1. Introduction

Learning time: 5h
Theory classes: 2h
Self study : 3h

Description:
Introduction to the concept of overlay and underlaying network, kinds of networks and typical examples.

2. p2p

Learning time: 16h
Theory classes: 6h
Self study : 10h

Description:
Concept of peer-to-peer. Generations of p2p networks. Security problems in p2p networks.

3. IP tunnels

Learning time: 26h
Theory classes: 2h
Laboratory classes: 4h
Self study : 20h

Description:
Creation and management of IPIP tunnels. Problems and solutions of tunnels.

4. Multicast

Learning time: 26h
Theory classes: 2h
Laboratory classes: 4h
Self study : 20h

Description:
Tools to manage multicast flows. Transmission of multicast flows (files and video streaming). Problems related to the use of multicast.

5. SIP

Learning time: 30h
Theory classes: 4h
Laboratory classes: 4h
Self study : 22h

Description:
SIP signalling. SIP session management. SIP call with and without proxies.

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6. CDN	Learning time: 6h Theory classes: 2h Self study : 4h
Description: Architecture and types of CDN networks. Technological examples.	

7. SDN	Learning time: 18h Theory classes: 6h Self study : 12h
Description: Architecture and technologies	

Planning of activities

Lab sessions	Hours: 12h Laboratory classes: 12h

Quizzes	Hours: 3h Theory classes: 3h

Lab exam	Hours: 2h Laboratory classes: 2h

Lectures	Hours: 26h Theory classes: 26h

Qualification system

Short answer quizzes: 60%
Laboratory exam: 30%
Attendance: 10%

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Regulations for carrying out activities

Each chapter will be evaluated by a quiz.
The laboratory exam will be practical (using the lab tools) and individual
Attendance is mandatory in lectures and lab sessions, and it will be controlled every class day.

Bibliography

Basic:

Perkins, C. RTP: audio and video for the internet. Boston: Addison-Wesley, 2003. ISBN 0672322498.

Rao, K.R.; Bojkovic, Z.S.; Milovanovic, D.A. Introduction to multimedia communications: applications, middleware, networking. Hoboken: Wiley, 2005. ISBN 0471467421.

Minoli, D. IP multicast with applications to IPTV and mobile DVB-H. Hoboken, NJ: Wiley, 2008. ISBN 9780470258156.

Complementary:

Panwar, S.S. [et al.].. TCP/IP essentials: a lab-based approach. Cambridge: Cambridge University, 2004. ISBN 052160124X.

Halsall, F. Multimedia communications: applications, networks, protocols and standards. Harlow: Addison-Wesley, 2001. ISBN 0201398184.