

UNIVERSITA' DEGLI STUDI MEDITERRANEA DI REGGIO CALABRIA

Subject Code 16490
Subject Name Telecommunication Networks and Telematics
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Department: DIIES
Class: L8
Type of educational activity: Lessons
Disciplinary Area: Telecommunication
Scientific-Disciplinary Sector: Ing-Inf/03

Compulsory preliminary exams: None
Course Year: III
Semester: I

ECTS: 12
Hours: 96

Synthetic description:

The module of Telecommunication Networks aims to give the fundamental knowledge about the most known data communication systems, computer networks, and telecommunications systems. The module of Telematics intends to give information on the basic principles of internetworking and on the design of networks based on the TCP/IP protocol suite.

Acquisition of knowledge on:

The course aims to provide the basic notions related to the most common data communication systems, computer networks, and telecommunications systems. It also provide knowledge on the principles of interconnection between heterogeneous networks to support the mobility of the terminal and users, and on the main wireless communication standards used as radio access network infrastructure to a fixed network infrastructure based on the communication protocol TCP / IP

Evaluation method:

Final oral examination preceded by a written test.

Student's independent work

Individual study and further insights on the topics addressed during lessons

Detailed course program

Introduction to telecommunication networks
Network Architectures and protocols

Protocol stack design

The ISO OSI protocol reference model

Criteria for network performance evaluation

Traffic characterization in telecommunication networks

Commutation in point-to-point networks

Terminal handling, polling, concentrators and statistical multiplexing

Network topologies: regular topologies and hierarchical topologies

Data link and MAC layers

Sliding windows protocols: study of Stop-&-Wait, Go-Back-N and Selective Repeat protocols and relevant performance

HDLC protocol and frame format

The MAC layer

Classification of Medium Access Control protocols

Aloha and Slotted-Aloha, explanation and performance evaluation with reference to throughput and delay parameters

CSMA, explanation and performance evaluation

Control Token protocols, explanation and performance evaluation with reference to throughput and delay parameters

Comparison among MAC protocols

Introduction to Local Area Networks (LAN)

LAN topologies

Motivation to LAN deployment

CSMA/CD protocol

Ethernet, "Token ring", "Token bus"

MAN networks as an extension and interconnection backbone of LANs

MAN DQDB, FDDI

Network interconnection

Concepts of Hub, Bridge, Router, Gateway and comparisons

Bridges from 802.X to 802.Y

Protocol converters

The Network layer

Network layer in X.25

Network layer in PSDN

Network layer in Arpanet: hints to IP protocol

Routing and routing protocols' classification

Basics of main routing protocols

Introduction to ISDN and B-ISDN networks

ISDN (Integrated Services Digital Network): architecture, configurations, and evolutions

PBX (Private Branch Exchange)

Introduction to B-ISDN

ATM protocol

ATM switching fabrics

Protocols of "Admission Control" and "policing" in ATM networks

The Internet and its protocols

Principles of internetworking of heterogeneous networks

Internet and the TCP-IP protocol stack

The principles of inter-process communications

Application layer

The client-server communication model

The application protocols in Internet (ftp, http, smtp)

Diagnosis tools (ping, traceroute)

The domain name system (DNS) and name resolution

IP addressing

IP-MAC address resolution: the ARP protocol

The IPv4 classful addressing scheme

Private addresses and NAT/NAPT

Subnets and Masks

The variable length subnet mask (VLSM) technique for IP address assignment

The IPv4 classless addressing scheme: CIDR and supernetting

Protocols for IP address assignment (RARP, BOOTP, DHCP)

IPv4 network protocol

The IP layer and its functions

The IP datagram

The error signalling protocol: ICMP

IP routing

IP routers and packet forwarding. Routing table management.

Autonomous systems in Internet

Intra-domain routing protocols (IGP): Distance Vector and Link State

IGP protocols: RIP/RIPv2, OSPF

Inter-domain routing protocols (EGP): BGPv4

Transport layer

Transport layer functions: ports and sockets

The TCP protocol: flow, error, and congestion control

The UDP protocol

Basics of RTP/RTCP and real-time services

Evolution of the Internet

Basics of the IPv6 and Mobile IP protocols

Future Internet paradigms

Resources and main references

- W. STALLINGS, *Trasmissione Dati e Reti di Computer*, Jackson Libri
- F. HALSALL, *Data Communications, Computer Networks and Open Systems*, Addison Wesley
- A.S.TANENBAUM, *Computer Networks*, Prentice Hall.
- N. Blefari Melazzi, *Internet: architettura, principali protocolli e linee evolutive*, McGraw-Hill
- J. F. Kurose, K.W. Ross, *Internet e Reti di calcolatori*, McGraw-Hill
- D. E. Comer, *Internetworking with TCP/IP (Vol. I)*, Prentice Hall 1995
- Lecture slides