One day Short course  
(could also be run as a half day course)

Multiservice and Multimedia Information Networking

by
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Intended Audience:
This short course is intended for engineers, researchers and managers who seek an understanding of emerging networking technologies and protocols aimed at supporting multiservice and multimedia applications, with emphasis on ATM.

Lecturer:
Dr. Andreas Pitsillides is currently an Associate Professor in the department of Computer Science (University of Cyprus). Prior to this he held the position of senior lecturer in the department of Electrical Engineering (Swinburne University of Technology) and founding Associate Director of the Laboratory for Telecommunications Research (Swinburne University of Technology). He has published over 40 technical papers, has given lectures and tutorials at a number of organisations and conferences, has been on the technical program committee of numerous conferences was the general chairman of the conference: “Role of Internet and World Wide Web in the construction of the Euro-Mediterranean Information Society”, and is widely consulted by government and industry. His research interests include Multimedia Information Networking, Broadband Integrated Services Digital Networks (B-ISDN), Asynchronous Transfer Mode (ATM), Modeling, Performance Evaluation, Dynamics and Control of Network Systems, and Intelligent Control (e.g. Adaptive and Fuzzy Control).

Objective:
The objective of this short course is to give a basic understanding of high speed multiservice and multimedia networking, and highlight some of the difficulties in their design, control, and management. Driven by the desire for distributed "multimedia applications" and computing, high speed networks have recently generated a lot of interest, as for example the standardisation of ATM as the transfer mode in BISDN (tailored to become the universal future public telecommunication network), the establishment of the ATM Forum (a consortium consisting of computer manufacturers, telecommunication companies, and others), as well as parallel activities to develop high speed extensions of current LANs (e.g. 100 Mbit/sec Ethernet and gigabit Ethernet,) and the next generation Internet, (IPv6). In this short course, following a brief description of multimedia applications, we identify the new communication requirements that these applications introduce and describe new emerging technologies and standards (ATM, 100 Mbit/sec Ethernet, IPv6, etc.) that are expected to meet these requirements. Next we will discuss real time multiservice and multimedia traffic and identify the quality of service
requirements for users. Different modeling approaches (that attempt to capture the 
essential behavior of multimedia traffic streams) for designing effective protocols, are 
examined next. The traffic underlying the various types of information have 
characteristics that differ substantially from each other, and from those of traditional 
applications for which existing protocols have been designed. This makes effective 
congestion control and resource management difficult to implement. A number of 
strategies will be described and discussed during the short course, with emphasis on 
ATM. Also we will briefly review emerging networking protocols for multimedia in the 
Internet Protocol (IP) world.

Outline:
I. Multimedia Applications and Requirements
II. Multiservice and Multimedia Networks
   - Existing Technologies (e.g. Ethernet, token ring and FDDI in the local area 
environment; and packet-switched and circuit-switched services in the wide 
area environment)
   - Emerging Technologies and standards (e.g. 100 Mbit/sec Ethernet LAN, FDDI-II 
   LAN, DQDB MAN, ATM LAN, SDH, Broadband ISDN, Internet Protocol V6)
   - Internetworking issues
   - Session layer protocols
III. Asynchronous Transfer Mode (ATM)
   - Objectives
   - Basic Concepts
   - Quality of Service
IV. Performance evaluation of high speed networks (e.g. Grade of Service, Quality of 
   Service, and Throughput)
V. Traffic and Congestion Control Issues in ATM based Multimedia Networks
   - Traffic Modeling
   - Flow Control (e.g. Rate based, Credit based, ECN based)
   - Network Resource Management (e.g. Bandwidth Allocation, Connection 
   Admission Control)
   - Case studies:
     - Traffic Flow Control
     - Bandwidth Allocation and Connection Admission Control
VI. Networking Protocols for Multimedia in the Internet Protocol (IP) world:
   - network layer protocols
   - routing protocols (e.g. OSPF, MOSFP)
   - resource reservation protocols (ST-II, RSVP)
   - transport layer protocols (e.g. XTP, RTP)
   - next generation IP (IPv6)
VII. -Future Directions
VIII. Discussion

Note: for the half day course one may omit parts of sections IV, V and VI