MODERN COMMUNICATION SYSTEMS AND NETWORKS, 5 cr. D level

Moderna kommunikationssystem och nätverk (7,5 ECTS credits) MKN850

Syllabus approved by the Academic Board of the School on May 11, 2005. Effective starting spring term 2006.

PLACEMENT IN THE ACADEMIC SYSTEM

The course is included as an optional course in the Master's programme in Computer Systems Engineering or Electrical Engineering.

PREREQUISITES AND CONDITIONS FOR ADMISSION

Data Communication I or equivalent knowledge. Basic prerequisites for the master's programme.

PURPOSE AND OBJECTIVES

The goal of the course is to give experiences in obtaining information from advanced-level literature and scientific papers, and of critical examination of scientific results from the field of internetworking, local area networks, and surrounding areas. The course shall give understanding and knowledge of methods, protocols, architectures, and performance of modern communication systems and networks, including research results. The goal is also that each student shall get experiences of obtaining deeper knowledge in a specific subfield.

PRIMARY CONTENTS

Selected subjects will be treated in form of lectures and seminars. The focus is put on currently important fields, which means that the seminar subjects will be adapted for the actual course start. Although, possible subjects to be penetrated can be mentioned: routing in large internet networks (e.g., BGP4), multimedia communications, traffic models, VLAN, switch and router architectures, active networks, TCP details, application protocols, multicasting, protocols for optical networks, networks in parallel and distributed systems, system area networks (e.g. Infiniband), scheduling in packet-switched networks, admission control, Internet QoS (RSVP, DiffServ, RTP etc), and IP telephony. Each student shall, in group, do a larger project exercise or write a paper (investigation, simulation, experiment or similar) to get deeper understanding of a specific subfield.

INSTRUCTION AND EXAMINATION OF STUDENTS

The teaching consists of lectures, seminars and a larger project exercise (or paper). The students attending the course give the seminars. Examination is done in form of attendance and quizzes in connection with the lectures and/or the seminars, and project reports and presentations. The course includes 3 points theory and 2 points project work.

Grades for the entire course are assigned on the scale Fail (U), 3, 4, and 5 (the grading system used in most Swedish, technical educations where 3 is the equivalent to a Pass).

COURSE EVALUATION

When the course is finished the director of studies is responsible for giving the students the oportunity to participate in course evaluation. The results from the course evaluation will be used for further development and planning of the course. Participation in course evaluation is anonymous. The results are communicated to the director of studies, lableader, teacher and students. A list of results and proposed measures are reported to the school board.

COURSE LITERATURE

Scientific papers, slide copies from the lectures, and possibly selected book chapters. The list below gives a hint of the course literature but will be updated for the actual course start to, e.g., reflect for recent advances in the field.

F. Abel, C. Minkenberg, R. P. Luijten, M. Gusat, and I. Iliadis, "A four-terabit single-stage packet switch with large round-trip time support", *Proc. 10th IEEE Symposium on High Performance Interconnects (Hot Interconnects'02)*, 2002.

B. Quoitin et al., "Interdomain traffic engineering with BGP", *IEEE Communications Magazine*, vol. 41, no. 5, pp. 122-128, May 2003.

D. Decasper et al., "Scalable high-performance active network node", *IEEE Network*, vol. 13., no. 1, pp. 8-19, Jan./Feb. 1999.

G. Costa and H.R. Sirisena, "Freeze TCP with timestamps for fast packet loss recovery after disconnections", *Computer Communications*, vol. 26, no. 15, pp. 1792-1799, Sept. 2003.

C. Diot et al., "Deployment issues for the IP multicast service and architecture", *IEEE Network*, vol. 14, no. 1, pp. 78-88, Jan./Feb. 2000.

F. Petrini, "Scalable collective communication on the ASCI Q machine", *Proc. 11th Symposium on High Performance Interconnects (Hot Interconnects'03)*, 2003.

J. C. Sancho et al., "Analyzing the influence of virtual lanes on the performance of Infiniband networks", *Proc. IEEE International Parallel and Distributed Processing Symposium (IPDPS'2002)*, Apr. 15-19, 2002, pp. 166-175.

H. Zhang, "Service disciplines for guaranteed performance service in packet-switching networks", *Proceedings of the IEEE*, vol. 83, no. 10, pp. 1374-1396, Oct. 1995.

G. Kramer et al, "Supporting differentiated classes of service in Ethernet passive optical networks", *Journal of Optical Networking*, vol. 1, no. 8-9, Aug./Sept. 2002.

V. Fineberg, "A practical architecture for implementing end-to-end QoS in an IP network", *IEEE Communications Magazine*, vol. 40, no. 1, pp. 122-130, Jan. 2002.

K. Zhu and B. Mukherjee, "A review of traffic grooming in WDM optical networks: architecture and challenges", *Optical Networks Magazine*, vol. 4, no. 2, pp. 55-64, Mar./Apr. 2003.

H. Kirrmann and P. Zuber, "The IEC/IEEE train communication network", *IEEE Micro*, vol. 21, no. 2, pp. 81-92, Mar.-Apr. 2001.

M. Junginger and Y. Lee, "The multi-ring topology high-performance group communication in peer-to-peer networks", *Proc. 2nd International Conference on Peer-to-peer Computing*, Sept. 5-7, 2002, pp. 49-56.

S. Ramanathan and R. Gusella, "A home network controller for providing broadband access to residential subscribers", *IEEE Transactions on Consumer Electronics*, vol. 41, no. 3, pp. 859-868, Aug. 1995.