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Waël Noureddine

EDUCATION

June 2002 Stanford University Stanford, CA

Ph.D., Electrical Engineering

Area: TCP congestion control and performance, data and multimedia applications performance in networks offering differentiated services. Academic advisor: Prof. F. Tobagi, Thesis Committee: Profs. N. McKeown and N. Bambos. Coursework: High Performance Computer Networks, Advanced Topics In Networking, Digital Switching, Cryptography, Queuing Theory, Parallel Computer Architecture, Interconnection Networks, Digital Systems Design, and Investment Science.

June 1998 Stanford University Stanford, CA

M.S., Electrical Engineering

Depth sequences in high-speed computer networks and computer architecture. Coursework: Computer Architecture, Processor Design, Logic Design, VLSI, Communication Systems, Internet Protocols And Standards, Multimedia Networks, Wireless Communications. GPA 4.0/4.0

June 1996 American University of Beirut Beirut, Lebanon

B.E., Computer and Communications Engineering

Coursework: computer software and hardware, Advanced Algorithms, Advanced Computer Architecture, Computer Networks, Analog, Digital And Microwave Communications, Control, Digital Signal Processing. GPA 3.93/4.0.

DISTINCTIONS AND SCHOLARSHIPS

Graduated with distinction (July 1996). Dean's Honor List, American University of Beirut (all semesters 1992-96). Ranked first at both the engineering and architecture acceptance lists, American University of Beirut (1992). Hariri Foundation scholarship (1992-96) and medal of excellence (1996).

SUMMARY OF RESEARCH

Studied the mixing of data applications and real-time multimedia applications in the context of Ethernet LAN networks. As a result, established the need for separating different traffic types in the network, and using full duplex links.

Studied the performance of TCP in switched LAN environments, and the performance improvements made possible by the use of hop-by-hop flow control. In particular, investigated the use of IEEE802.3x flow control in switched Ethernet environments carrying data and real-time traffic. Established the need for flow control to be selective, i.e. based on traffic class and destination address information, indicating the need for such information to be carried in IEEE802.3x pause messages.

Studied the user-perceived performance of popular TCP applications in the presence of network congestion, using accurate models of the actual applications, traffic and user behavior. Demonstrated how multiple service levels in the network, in the form of multiple traffic classes or drop priorities can be used to improve the user-perceived performance of interactive applications during congestion. Developed the required TCP-state based packet marking and scheduling mechanisms at the sources of traffic.

Studied the problem of provisioning bandwidth resources at switching nodes in networks carrying data and streaming multimedia traffic. Showed how service differentiation mechanisms in the form of multiple traffic queues and different drop priorities within each queue can be used to efficiently support the different applications.

PUBLICATIONS

- W. Noureddine, F. Tobagi, "*Improving the Performance of Interactive TCP Applications using Service Differentiation*", in Computer Networks, Volume 40 Number 1, August 2002.
- W. Noureddine, F. Tobagi, "*Improving the Performance of Interactive TCP Applications using Service Differentiation*", in Proceedings of INFOCOM, June 2002.
- F. Tobagi, W. Noureddine, B. Chen, A. Markopoulou, C. Fraleigh, M. Karam, J-M Pulido, J. Kimura, "*Service Differentiation in the Internet for the Support Multimedia Traffic*", in Springer Verlag LNCS, Vol. 2170, September 2001.
- W. Noureddine, F. Tobagi, "*Selective Back-Pressure in Switched Ethernet LANs*", in Proceedings of GLOBECOM, December 1999.
- F. Tobagi, C. Fraleigh, M. Karam, W. Noureddine, " *Assessment of Traffic Prioritization in Switched LANs carrying Multimedia Traffic* ", Technical Report, September 1997.

EXPERIENCE

July 00 - September 00 Nokia Research Center Mountain View, CA

Research Intern

Investigated different approaches to provisioning and traffic management in networks offering differentiated services, using mechanisms for measurement-based admission control and protocols such as COPS, RSVP, MPLS and OSPF. Proposed an integrated system design for automated traffic management, admission control, accounting, policy enforcement and Service Level Agreement (SLA) negotiation.

July 97 - September 97 3Com Corporation Santa Clara, CA

Research Intern

Worked with the 3Com Multimedia Initiative laboratory. Work involved the installation of an experimental multimedia-enabled high-speed network infrastructure, monitoring and network management covering all layers of OSI stack, traffic analysis and generation. Deployed Multicast enabled applications and analyzed their interaction with bandwidth bottlenecks. Used 3Com, Cisco and Netcom equipment and software.

July 95 - September 95 CCC International Athens, Greece

Software Engineer

Designed and implemented using MS Access a software system for flight information and support logistics management.

TEACHING EXPERIENCE

1996 - 2000 Stanford University Stanford, CA

Teaching Assistant

- September 96 - December 96 and September 00 - December 00, worked as teaching assistant for and helped in restructuring EE284, a graduate level introduction to computer networks.
- April 97 - June 97, worked as teaching assistant for and helped in creating EE384B, a course in multimedia networks.
- January 98 - March 98 and January 00 - March 00, worked as teaching assistant for and helped in expanding the material of EE384A, a graduate level course in Network Protocols and Standards. Designed and implemented programming assignments covering IEEE802.1 Spanning Tree Protocol, LAN forwarding, GARP and OSPF.

COMPUTER SKILLS

Languages: C/C++, tcl, Java, Verilog, Perl, HTML, FORTRAN, Basic, MATLAB, Assembly language programming. Environments: UNIX and Windows. Software: MS Access, Excel, Word, PowerPoint, and MS Project, Magic, Network Simulator (ns).

OBJECTIVE

Seeking a full-time position in engineering, research and/or design.