COURSE ANNOUNCEMENT

EE 659
Interconnection Networks
Spring 2002

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This interesting research-oriented course focuses on the design and analysis of state-of-the-art interconnection network architectures for multiprocessor/multicomputer and network-based computing systems. Several high-performance interconnection networks have recently been introduced into the market that increase reliability, availability, and system serviceability at several levels in order to meet the needs of bandwidth-hungry applications—such as video/audio on-demand servers, on-line transaction systems, decision support systems, etc. These networks are incorporating many of the switching, flow control, routing, and deadlock handling techniques covered in this course. This course also covers Network Processor architectures (www.linleygroup.com/npu/) and may touch on emerging optical/photonic-based networks. NOTE: Enrollment limited to 15.

PREREQUISITES: EE 557, CS402, and CS455.
GRADING: Grading will be based on homeworks, class presentations, and a term project consisting of students designing and evaluating the performance of a multiprocessor interconnect based on the principles learned in class.

TEXT: Readings will be taken from reference material from current literature and from the text entitled, “Interconnection Networks: An Engineering Approach,” by Duato, Yalamanchili, and Ni. Course notes will also be provided.

Tentative Course Outline:

I. Fundamentals: Overview of Interconnect Network Characteristics and Design Issues
*** taxonomy of network topologies, basics of switching, routing, and flow control.

II. Layer 2 Switching/Routing: Theoretic Support for Deadlock-Free Routing
** deadlock-avoidance/recovery, fault-tolerant routing, dynamic network reconfiguration.

III. Layer 3 Switching/Routing: Network Interface and Messaging Support
** partitioning, virtual interface architecture, collective communication support, QoS.

IV. Case Study on Recent Architectures: We will do an in-depth study of Infini-Band Architecture (www.infinibandta.org), which includes channel adapter and switch/router architecture, network management issues, and use as server I/O, SAN, STAN, and LAN communication backbone. Students will also have the opportunity to do comparison studies of state-of-the-art Network Processors.