Course Title  IT455 Network Protocols (3-0-2-4)
Semester  Autumn, 2012-13
Course Type  BTech - Technical Elective (Open to MTech and PhD)
Prerequisite  IT304 Computer Networks or equivalent
Instructor  Sanjay Srivastava

Course Content

This is an advanced undergraduate course that provides an in-depth understanding of a selection of network protocols - algorithms, design, and analysis. The course also provides insight into how network research is done.

A selection of network protocols will be taken up to understand the underlying algorithms and design principles. In particular, we will study network time protocol (NTP), Reliable Multicast protocols, Adaptive multicasts – real-time transport protocol (RTP) and variants, Network congestion control algorithms including TCP variants and active queue management protocols, and quality of service enabling protocols like Diffserv and RSVP protocols.

In addition, we will also look at some wireless ad hoc network specific protocols for node data aggregation and extraction, topology control, and cooperation problems. To gain a concrete understanding of protocol design principles and performance measurement, a semester long project in protocol design and simulation will be an integral part of the course.

Outcomes and Objectives

It is expected that at the end of the course, students will be able to design network protocols to solve specific networking problems. Students will be able to measure the performance of the protocols using suitable metrics by simulating the protocol. Finally, students will be able to gain an insight into how network research problems are conceived, analyzed and solved.

(Rerun says it much better!)
Course Content

<table>
<thead>
<tr>
<th>Topic Name</th>
<th>Content</th>
<th>No of lectures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overview</td>
<td>Protocol Design Philosophies. Design Methodologies and Protocol tool box. Network Simulation and analysis of simulation results.</td>
<td>6</td>
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<tr>
<td>NTP</td>
<td>Problem Specification, Network Time Protocol, Underlying algorithms, Scaling challenges.</td>
<td>3</td>
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<tr>
<td>Multicast</td>
<td>Reliable Multicasting, QoS in Multicast, Adaptive Multicast</td>
<td>6</td>
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<tr>
<td>Congestion</td>
<td>Congestion Control Problem, TCP variants, Performance analysis, Active Queue management (AQM) algorithms and analysis</td>
<td>6</td>
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<tr>
<td>QoS</td>
<td>Diffserv and RSVP protocols</td>
<td>4</td>
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<tr>
<td>Cross Layer</td>
<td>Cross Layer Design Techniques</td>
<td>3</td>
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<tr>
<td>Ad Hoc Network Apps</td>
<td>Topology Control, Cooperation, and Data Integration: Problem specifications and Algorithms</td>
<td>10</td>
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Standard Textbooks for background study

(Course content will primarily be driven by a selection of readings from research literature and RFCs.)
4. Murthy and Manoj, Ad Hoc Wireless Networks

Evaluation Components

1. Mid Semester Test/Quiz 20%
2. Final Examination 30%
3. Lab, HW, Project 50%