**CpE 319 – Digital Network Design**
**Team Report Due: Noon, 9 May 2004**

**Team Project**
A company has two engineering divisions and a business/financial support administrative group. The company is moving to a new campus-like facility in which each group or division will have its own building, its own LAN, and room for expansion. The Real-Time Engineering Division has 150 engineers, who develop and use numerically-intensive applications on UNIX workstations. The HCI Engineering Division also has 150 engineers; however, each of these individuals develops and run software which needs a fast response time for human-computer interaction on PCs. Lastly, the business/financial support group of 30 staff primarily run office applications on their PCs; however, at the end of each month and the end of each quarter, they have significant payroll and financial transactions with the company's **server** which is housed in their building. The **server** and individual computers are already purchased.

**Tasks**
**Phase 1.** Design each of the three LANs and their inter-connection into a corporate network subject to the above constraints and that performance is the driving issue as long as cost is reasonable.

- Define your performance criteria for each division and the administrative group. See section 6.6 (pp. 557-573) of the Tanenbaum text for an overview of performance considerations in computer networks.
- Specify the metrics (i.e., measurable quantities) for assessing the performance of your network design. Evaluate the quality of service metrics that can be measured using OPNET to assess the performance of your network design. Are these metrics adequate to evaluate your performance criteria based on your network design? Are there metrics that you would consider measuring but OPNET does not measure? Include this in your discussion of the strengths/limitations of OPNET as a computer-aided tool.

**Phase 2.** Modify your design given the fact the Real-Time Engineering Division is projected to double in size within a year and to quadruple in size within two years and that:
(for teams # 1-7), the HCI Division is expected to double within two years
(for teams # 8-14), the Administrative Group is expected to double within two years.

In both phases, in addition to performance and cost, consider the maximum number of computers that can be connected, the number of file servers required, and any other appropriate items, e.g., firewall(s). Make intelligent assumptions (e.g., "reasonableness") and state them in your report.

**Phase 3.** Critically evaluate your design from Phase 2 for security considerations. Propose security mechanisms to be integrated with your network design. Make intelligent assumptions (e.g., "reasonableness") and state them in your report. Discuss the impact on network design, network operation, and cost.

**Team Report Evaluation Guidelines:**

**Technical Writing of Report (Maximum: 20 points)**
**Completeness, Timeliness, Length of Report (Maximum: 20 points)**

- Introduction and Background Information
- Design Methodology (must be a proven design approach)
- Description: overview and list of computer-aided tools used; team member roles
- Phase 1 Results: verification and testing, design comparisons, performance analysis, merit and relative cost analysis
- Phase 2 Results: verification and testing, design comparisons, performance analysis, merit and relative cost analysis
- Phase 3 Analysis: design comparisons, performance analysis, merit and relative cost analysis
- Evaluation of computer-aided tools: impact on design, testing, and verification; usability; appropriateness and limitations for project requirements
- Overall Conclusions and Recommendations: design, performance, merit and cost, overall recommendation based on constraints
- References
- Appendices: details of description, design, simulation results (OPNET print-outs, etc.)
- NOTE: maximum length of report (not including appendices): 9 pages (including all tables and figures referenced in the body of the report). Use a font size of 10 or greater and have margins of 1" for top, bottom, left and right.

**Evaluation of Contribution to Project by Team Members (Maximum: 10 Points)**
**Content of Report (Maximum: 100 points)**