Course Project Ideas

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1. NETWORK PLANNING

1. Challenges / Project Ideas

1.1 CAPACITY PLANNING:
   a) How to determine the capacity requirement for a new CO that to be built in a green field?
   b) How to design a fully redundant router while minimizing the usage hardware/software resources?
   c) How can we automate some of the capacity planning activities?
   d) How can we maximize the network link utilization?
   e) How to identify any possible SLA violation due to network capacity issues, and how to mitigate those risks?

1.2 NETWORK COVERAGE EXPANSION:
   a) How to determine the capacity requirement for a new CO that to be built in a green field?
   b) A comparative analysis between FTTH and FTTN (performance and investment)?
   c) How do you develop a “Network Access” business model for a new footprint expansion? In other words, how do you measure the effectiveness of an Access network design for expanding your services to a new community?
   d) For a new wireless provider, how would you develop their footprint expansion strategy so that their investment is minimized while covering a large geographical area?
1. NETWORK PLANNING

1.3 NETWORK SURVIVABILITY:
   a) How to design a fully redundant router while minimizing the usage hardware/software resources?
   b) How do you develop an efficient CO de-risking strategy/design?

1.4 NETWORK TRANSFORMATION:
   a) How to evaluate a network transformation plan i.e., quantifying the network performance improvement, quantifying the CAPEX savings, quantifying the ongoing OPEX savings?

1.5 NETWORK TRAFFIC MIGRATION:
   a) How do you design a traffic migration plan so that (i) the customers impact are minimized while transferring (ii) migrated traffic do not cause network congestion (iii) migration project saves CAPEX/OPEX in long run

1.6 NETWORK LIFECYCLE PLANNING:
   a) Given a network inventory, lifecycle budget, traffic priority/service requirement how to design a lifecycle planning strategy so that (i) priority traffic / SLA customers are guaranteed (ii) Probability of Network Equipment (NE) failure is minimized (iii) improves network performance (iv) saves CAPEX and OPEX (v) budget constraint is met.
1. NETWORK PLANNING

1.7 NETWORK INVENTORY / STATUS REPORTING:
   a) An inventory system that can auto update the network equipment status change in near-real time is extremely challenging!

1.8 CO SPACE / POWER PLANNING:
   a) An inventory system that can auto update the network equipment status change in near-real time is extremely challenging!

1.9 EXTERNAL CARRIER RELATIONS:
   a) Develop a traffic on-net / off-net distribution model that would perform the cost-benefit analysis which could be used for identifying a deal that works best for the ISP
NETWORK TECHNOLOGY DEVELOPMENT

- Product & Marketing
- Network Supply Chain
- Network Strategic Planning
- Network Traffic Forecast
- Network Economics
- Network Operations
- Technology Development
- Network Planning
1. Challenges / Project Ideas:

- **Project #1: Traffic Overbooking Ratio (OB Factor)**
  - **Project**: Given a network topology, a set of capacity parameters, and QoS requirement; you need to design and develop a link capacity threshold strategy to optimize the business objectives.

- **Project #2: Proactive QoS Monitoring**
  - **Project**: Given a network topology, specific service architecture, QoS parameters, and simulated data set; you need to design a prototype for proactive QoS monitoring.
2. NETWORK TECHNOLOGY DEVELOPMENT

- **Project #3: Network QoS study for ISP services**
  - **Project**: Given a set of ISP services (such as DSL, VoIP, IPTV etc.), your project needs to investigate the current status of the QoS parameters that are used to measure these services.
  - **Category**: Grad Survey Paper

- **Project #4: Network QoS study for e-Health services**
  - **Project**: Your project will (a) investigate the current status of the QoS parameters that are used to measure today’s eHealth services, (b) analyse the validity of these parameters, (c) identify if there is a need to establish a new set of QoS parameters for e-health services.
  - **Category**: Grad Survey Paper
2. NETWORK TECHNOLOGY DEVELOPMENT

- **Project #5: QoS Measurement for end-to-end networks**
  - **Project**: Given a specific service architecture and its QoS requirements, you need to design a methodology and tool to measure the end-to-end QoS performance

- **Project #6: Network BW upgrade strategy**
  - **Project**: Given a network architecture and link/router capacity details; your job is to advice the ISP’s executive team on future network speed upgrade strategy on Access, Edge, and Core networks.
NETWORK ECONOMICS

- Product & Marketing
- Network Supply Chain
- Network Strategic Planning
- Network Traffic Forecast
- Network Planning
- Technology Development
- Network Operations
- Network Economics
Network Costing: Project Examples

- **Project #1: Network Capacity Costing for Router & Link**
  - **Project:** Given a network equipment, capacity and cost details; you need to develop a methodology and a tool that can provide capacity costing (cost per port and / or cost per BW unit).

- **Project #2: Network Capacity Costing for a Cloud (Core for example)**
  - **Project:** Given a network topology for a particular network segment, capacity and cost details; you need to develop a methodology and a tool that can provide capacity costing (cost per port and / or cost per BW unit).
Network Costing: Project Examples

❑ Project #3: Develop a Network Service Costing Model
  ○ Project: Given a network topology, topology cost details, a specific service (Internet service for example) architecture; you need to develop a methodology and a tool that can cost out the specific service.

❑ Project #4: A Service Costing-Pricing Tool
  ○ Project: Given a network topology, topology cost details, a specific service (Internet service for example) architecture, and pricing guideline; you need to develop a methodology and a tool that can cost out the specific service and suggest a market price based on the pricing strategy.
NETWORK TRAFFIC FORECAST

Network Planning
Technology Development
Network Operations
Network Economics
Network Supply Chain
Network Strategic Planning
Product & Marketing
Network Traffic Forecast
Project Overview: Network Traffic Forecast

- **Project #1: Mapping Business Intelligence into Traffic Data**
  - **Project:** Given a set of internal / external traffic forecast parameters, you need to develop a methodology and tool that to convert the business intelligence / data into a traffic level distribution

- **Project #2: Mapping Traffic Forecast into CO level**
  - **Project:** Given a network topology, and traffic forecast associated to a set of internal and external parameters; you need to develop a methodology and a tool that can distribute the traffic data among the COs
Project Overview: Network Traffic Forecast

❑ Project #3: Mapping Traffic data into Capital Forecast at CO level
  o Project: Given a detailed CO level network topology, current capacity parameters, and projected traffic load; you need to develop a methodology and tool that can convert the given traffic load into capital forecast (how much investment is required)

❑ Project #4: ISP Traffic Forecast Study
  o Project: You need to (a) review the major recent research works done in network traffic forecast area, (b) identify whether the existing research findings can be effectively utilized in an ISP traffic forecast environment, and identifying the missing links (c) provide a framework that you think would be able to forecast ISP traffic effectively
Project Overview: Network Traffic Forecast

- **Project #5: Traffic Forecast for Content Delivery Network (CDN)**
  - **Project**: Given network traffic forecast (content popularity index), you need to design a Content Delivery Network (CDN) that will both benefit ISP and its customers by bringing the contents closer to home / customers