CS 4457A: Computer Networks II
Department of Computer Science
Western University
Assignment 1
Fall 2019
Due Date: Oct 6th, 2019

Purpose

The goals of this assignment are the following:

- Get experience with ISP networks architecture, design, and ISP’s major technical functionalities

Problems

1. Imagine yourself as a Central Office (CO) capacity planner. You are given a detailed CO level network topology (i.e., how the network equipment NEs are connected inside a CO), current capacity details of these routers/NEs (i.e., current utilization levels), and projected traffic load (how much additional future traffic is estimated that need to be served by this CO). Your task is to develop a methodology that can be used to determine if any additional router/line cards are required in this CO to meet the projected traffic demand; and if any new purchases are necessary what would be the estimated capital expense. (25 points)

2. Based on a number of given Internet services and their bandwidth requirement on a fixed Internet platform (for a single residential customer), you will develop methodologies and a bandwidth requirement forecast tool (excel file based simple model) to estimate the residential Internet bandwidth/speed for an average sized household. (25 points)

3. As discussed in the class, bringing the media content closer to the end-users/customers not only improves the customer experience but also saves operational expenses for the ISPs. Imagine yourself as a content delivery network designer, and your job is to design on-net locations (inside ISP network) for placing the content servers. In order to design such content architecture, which layers (core, edge, aggregation etc.), what type of architecture (i.e., centralized or distributed), and what metrics you would consider (and why) to evaluate your design choices/options. (25 points)

4. As discussed in the class, a number of factors lead to network upgrade activities (i.e., infrastructure modernization) for an ISP. Some of these drivers are new technology, new product, network equipment (NE) reliability/security issue, network performance issue, customer requirement, NE end of support etc. Given a limited budget for network upgrade activity, as a network modernization manager, develop a step-by-step guideline that you would use to perform the network upgrades/modernization plan. (25 points)