Purpose

The goals of this assignment are the following:

- Get experience with ISP’s major functional areas, network traffic forecast, network QoS/QoE, and network costing.

Problems

1. Assume an ISP ABC Inc. is preparing to launch a new VR based application (which consumes significant bandwidth) for its customers. ISP ABC Inc. is currently evaluating its network for supporting this application. Refer to the “major functional areas in ISP” diagram discussed in the class: (a) Which of these functional units will be engaged in this process; (b) Which functional unit will perform what tasks; (c) What will be the collaboration model between these units ($5 + 5 + 5 = 15$ points)

2. Refer to the slide 9 of Lecture 3. Provide an example for each of the traffic forecast factors in both categories. Can you think of any other metric/s in both categories that may contribute to the traffic forecast? ($14 + 4 = 18$ points)

3. Network latency for a data packet (such as IP packet) is defined as the total time it takes for an IP packet to reach from a sender port of a router to a receiver port of another router. What are the factors that you think contribute to this network latency? If the latency between two end points are much higher than its normal range, what main factor/s are possibly contributing to this additional latency? As a network planner, what changes you would like to make in the network so that the future traffic between those two end points do not experience such high latency? ($5 + 5 + 15 = 25$ points)

4. Imagine yourself as a QoE analyst, and you are designing customer experience metrics for regular web browsing application, video on demand application, and a video conferencing call application. List three QoE metrics (and a brief explanation for each metric) for each of these applications that you think will quantify customer experience. ($18$ points)

5. Imagine you are the network cost planner for an ISP ABC Inc. that is building a new CO to expand its footprint. As part of that new build, ABC needs to purchase a number of DR, PE, and Core routers as well as other supporting network devices for that new CO. Also, in order to maintain these network equipment there will be ongoing monthly / yearly expenses. (a) Identify all the CAPEX and OPEX related items related to this new CO build; (b) Assume the capital cost of the NEs and OPEX are given, and also assume you know the total projected yearly revenue for this CO, develop a methodology to find out the time (years) it takes for ABC Inc. to reach a breakeven point for this new investment? (c) If you consider NE life cycle as another factor in this model, how it will impact the breakeven point? ($10 + 12 + 2 = 24$ points)