

CpE/NIS654 Design and Analysis of Network Systems

Fall 2017

Homework 02

Please Note that homework covers design process, starting with developing requirements and then coming up with an architecture for your network. Questions related to this topic often have really no ‘right’ or “wrong” answer. Your analysis, justification, and logic behind your answers is, at times more important. This assignment, like many in this course are to encourage you gain deeper understanding of the embedded concepts rather than just an answer. We encourage you to take every opportunity to explain and expand on what is being asked for pedagogical reasons.

Problem 1: Chapters 1 through 3 of the text are on how to gather customer requirements and make sure that they reflect what eventually the design should be based on. This is generally not easy since there may be many customers of your design (CEO, CIO, Network Administrator, e.g.), each with his/her views of what is needed. Also, as the project progresses, their views may change or the available technology may change. In short as these chapters imply, capturing customer requirements which you design to is not easy and requires careful planning and a disciplined approach.

Your boss has identified an enterprise customer and charged you with developing this customer’s requirements for a network they are looking for before embarking on the architecture and design phase. The first step he/she has asked you to take is to develop a strategy you wish to follow to accomplish this. Develop such a strategy for your boss as an answer to this question.

Hint: as you can see, this is an open ended question. But a short well written answer would give your boss the confidence that you indeed can capture customer requirements accurately through your strategy. You may want to assume that Chapters 1 through 3 of the text provide a nice way to develop such a strategy for your boss. Though you don’t have to follow the concepts and strategies in Chapters 1, 2, and 3, you may develop better insight into this process by first digesting the content of these Chapters and then developing and writing out a strategy of your own derived from your insight.

Problem 2: Services to be supported by a network can play an important role in the design of a network. Provide supportive arguments for it by discussing how

*Chapters refer to the text book for the course: James D. McCabe, “Network Analysis, Architecture and Design”, Third Edition, Morgan Kaufmann Publishers.

architectures for two services: CDN (Content Delivery network), and VOIP (Voice over IP) may differ to efficiently support these two services. You are also welcome to use other services of your choice to argue this point.

Problem 3: Do exercise 8, Chapter 2 (page 96)*:

Delay performance is increasingly important is user and application requirements. Describe why delay is important in the following applications:

- Voice over IP (VOIP)
- Non Buffered (real time) video or audio playback
- teleconferencing

Problem 4: Do Exercise 7, Chapter 3 (Page 157)*

Service metrics are used to monitor, measure, and verify services in the network and determine if performance requirements are being met. Therefore, service metrics must be meaningful to the network operators, managers, users, and staff. For each performance requirement below, describe a service metric that could be used to measure and verify the requirement.

- a) Reliability of a T1 link between an enterprise network and its ISP, with IP routers on each end of the T1.
- b) Round-trip delay between devices on a network, say network A, and servers on a LAN, say server LAN B.
- c) Average traffic rate in and out of a compute server, measured across all 4 of its LAN interfaces over 15-minute intervals.

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