DT154G Network Technology B

Homework Assignment 2

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Contents

Aids Course literature, dictionary and lecture materials.

Maximum points 25

Questions 7

History repeats itself

This homework assignment is part of the second half of the course Network Technology B.

1 Examination

Always motivate your unique answers, show all your calculations and give proper references on all your answers. Failure to do this will result in an F on the

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assignment even though your answers may be correct. This assignment is to be performed individually and all the answers must be written in your own words such that you show that you have understood both the question and your answer. This assignment will be checked against Urkund, which is an anti-plagiarism tool. The grade on this assignment will be pass (P) or fail (F). If you get an F or Fx you will be given the chance to supplement your assignment. When Fx you will have one week to make the necessary corrections, if F you will have to redo the assignment and it will be graded at the next planned grading for that assignment. The questions in this homework is ordered in such a way that after a lecture you will be able to answer the corresponding question in this homework assignment.

1.1 Preliminary grade

The following grading criteria applies: $F < 50\% \leq Fx < 60\% \leq P$ with no question awarded zero points.

2 Aim

After completion of homework 2 you will have shown that you

- Have fundamental knowledge in the most common layer two WAN protocols.

- Have basic knowledge in how binary data is transmitted over an analogue medium.

- Explain about different ways used to preserve IPv4 adresses.

- Know how to correctly abbreviate IPv6 adresses.

- Can name and explain different ways to setup a secure site-to-site link over the public network.

- Have an overview of network monitoring systems

3 Reading instructions

Homework 2 covers the second half of the course Network Technology B. You should therefore have read [1, Ch 1-9], and attended or read the lectures from the second part of this course in order to be able to answer all the questions. You can however finish part of this homework assignment after each covered chapter in the course.

4   Tasks

You arrive at work one early Friday, the sun is just about to set. When you arrive in your padded office you find a letter resting carefully on your keyboard. The envelope is made by a thick cream colored paper and your name has been hand-written in gold by a professional calligraphist. Next to the letter is a small gift wrapped box with the note 'open first' on it. You open the box very carefully, preparing for the worst. Inside you find a silver letter-opener... Apparently whoever gave you that letter didn't want you to destroy the nice envelope. Carefully you open the letter and inside you find an invite for a job interview at the IT-department for the company that resides in that nice skyscraper next to your office building. Apparently someone in that company have heard about you and are interested to see what you have to offer. You get this strange feeling, you try to figure out what it is, it might be excitement, but it was so long ago you had that feeling you try to just shrug it off.

The job interview is tomorrow (today), so all you can do is start preparing yourself by digging into those books and start studying!

After a long night of reading you feel well prepared and it is now time to start heading towards the company. That standing stag that you have seen so many times before have never looked as magnificent as it does today. Even more, before you hated that blinding reflection of the building, now you can't get enough of it, it actually fills you with joy. Inside the building the lobby is even nicer than you could possibly imagine. Floor tiles that are so clean you can see your reflection in it. There even is a chocolate fondue fountain in the middle of the big hall. You the receptionist your invite and with a smile you got sent up to the 19th floor. The elevator ride takes for ages, especially due to the elevator music, your old self would hate it, now you find yourself singing along, and don't want it to stop.

Once you arrive in the office however the idyll stops. The office is loud, people are screaming and running all over the places, phones are ringing everywhere, you can hardly hear yourself thinking. Nobody seems to have their own office space, there are just a lot of tables placed in a big open room. You actually see two people fist fighting over a table at a window. There are safe-boxes all over the place. You manage to get a glimpse of the contents of one, and all they stored was some paper. Another brawl starts in the far end of the office and some coffee were thrown at a person. You are starting to miss your calm padded office by now, you know asbestos is not good for your health, but you feel like that environment is healthier than this one at least.

A person runs up to you. You are getting an intense feeling of stress just by being close to this person. The person says something so fast that you can't understand a single word of it, you assume that you should just follow and see where you end up, anywhere but here is better.

The person takes you to an office where the boss is sitting. There are 10 mobile phones are lined up on the bosses desk and they all take turns ringing. If the person who escorted you to the boss made you feel stressed, the boss makes you want to go home and sleep for a month. Between the phone calls you got

thrown questions at you, try to answer them as correctly and briefly as possible.

1. What makes PPP still such a highly used protocol is its flexibility.

(3p)   (a) Explain about the layered architecture of PPP.

(2p)   (b) Since it is a bit boring to just speak of PPP itself, mention to the interviewer about PPPoE and when mention at least one reason why you would like to run this.

(3p) 2. Frame-relay itself is not a particularly used datalink-protocol any more. However there are some concepts related to Frame-Relay that is still spoken about in other contexts as well, such as Access rate, Committed Information Rate and Data Bursting. Explain these concepts to the boss.

3. Two very common techniques for delivering internet connection to the public is by using the existing infrastructure at hand. The telephone cables in our homes usually supply us with a *bandwidth between 3 kHz to 1 Mhz.* This bandwidth is then usually *divided into 256 channels, where each channel is 4 kHz.*

(2p)   (a) If we use a modulation of 15 bits per baud, how much data in bps can we transfer on one channel?

(2p)   (b) How many channels do we need to get a 10 Mb/s downstream connection?

(1p)   (c) How come it is not always possible to reach these speeds?

4. When we take a step up in the TCP/IP model and land on the network layer there are some interesting problems that we should address.

(2p)   (a) Explain to the boss why NAT is needed. Be as objective as you possible can about this subject, it can be a sensitive area.

(2p)   (b) Explain CGNAT, what are the advantages and the disadvantage. Explain why we need it.

5. IPv6 is a hassle to write, luckily in [2] they have addressed this issue. Following the recommendations in this RFC, rewrite the following IPv6 addresses.

(1p)   (a) 0AA7:0000:0000:0Fe8:1432:9999:0000:0000

(1p)   (b) FeeD:aBBa:dead:1eeF:5000:0000:0000:7654

(1p)   (c) 0000:0000:fE81:0000:0000:0000:0000:0001

(1p)   (d) 1234:4321:0000:DECA:F0ca:fe00:0012:AAa1

6. Before when we needed a connection between two branches, we had to get a private WAN-link. Now a days we can suffice with just a public internet connection.

(1p)   (a) List the different types of VPNs mentioned in the CCNA-curriculum.

(1p)   (b) When it is suitable to use them?

(2p) 7. Draw a picture that shows all the components of SNMP and how they relate to each other.

The boss waves you away and you go back to your old office confused and still with the feeling of intense stress...

5   Submissions

Before submitting, make sure that your solutions follow the criteria given in section 1. Your solutions to all the numbered questions must be submitted in *PDF-format.*

References

[1] Connecting networks : companion guide. Indianapolis, Indiana, 2014. ISBN 9781587133329 (hardback).

[2] S. Kawamura and M. Kawashima. A Recommendation for IPv6 Address Text Representation. RFC 5952 (Proposed Standard), August 2010. URL `http://www.ietf.org/rfc/rfc5952.txt`.