Mittuniversitetet
MID SWEDEN UNIVERSITY

DT153G Network Technology A

Homework Assignment 1

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Contents

Aids Course literature, dictionary and lecture materials.

The Internship

This homework assignment is part of the first half of the course Network Technology A.

1 Aim

After completion of homework 1 you will have shown that you

- can identify the functionality of each layer in the TCP/IP-model,

- have a good understanding of basic network terminology,

- have fundamental knowledge of basic switching principles,

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- are able to perform decimal to binary translations,

- can identify the subnet mask and network id of a given IP address.

2 Reading instructions

Before starting Homework 1, you must have read up to and including Chapter 11 in [1], and attended or read the lectures from the first part of this course.

3 Tasks

3.1 The interview

1. Explain the following keep the answers brief, stick to the subject and don't hold out on any relevant information.

(1p)   (a) Client-server

(1p)   (b) Peer-to-peer

(1p)   (c) Difference between LAN, WAN, MAN

(2p)   (d) How the Internet works

(1p)   (e) Circuit-switched networks

(1p)   (f) Packet-switched networks

(1p)   (g) Connection-oriented networks

(1p)   (h) Connectionless networks

(2p) 2. Explain the OSI-model and the TCP/IP-model and their different purposes.

(2p) 3. Name and describe the following standardisation organisations: EIA, TIA, ITU-T, ICANN, IANA, IEEE and SIS.

4. Describe how a computer is able to get data out of just electrical impulses in a cable. How does it know if it receives a one or a zero?".

(2p)   (a) Explain NRZ and Manchester encoding, how they work, what are the advantages and disadvantage to the different techniques and when they are used. To better make your point, use graphics to help with your explanation.

(1p)   (b) *(Optional)* What type of line encoding technique is used in modern gigabit ethernet? How does it work?

5. How come even if you have a 1Gb/s ethernet network at home, you do not reach a speed of 1GB/s

(1p)   (a) Explain the difference between bits and bytes.

(3p)   (b) The different ways to measure the speed of a network, that is digital bandwidth, throughput, goodput.

(1p)   (c) Finallywhat theoretical speed could be reached in bytes per second on his gigabit ethernet LAN. Show this using a calculation.

6. Regarding switches, using a few sentences, describe

(1p)   (a) CAM tables,

(2p)   (b) different types of switching fabrics,

(2p)   (c) switch forwarding methods, and

(2p)   (d) types of memory buffering and the advantages and disadvantages of the two main types.

7. IPv6 is starting to become more and more common,

(1p)   (a) What's the big deal?

(1p)   (b) Spin further on your answer by going in to how a router works and how it sends a packet to its destination according to the "best route", but what exactly does that mean?

(2p)   (c) Explain about IP's connectionless, best effort and media independent properties.

(1p) 8. (a) "When a packet arrives at the destination, how does the computer know to which application the data should be delivered to?" Make sure that your answer covers socket addresses and socket pairs.

(1p)   (b) Based on that IP is best effort and connectionless, how can you then be sure that the data is delivered correctly? And in order to the destination?

9. Translate these IP-addresses to binary, and what is the network id and subnet mask of that address.

(1p)   (a) 192.168.0.1/24

(1p)   (b) 209.168.15.62/24

(1p)   (c) 4.3.2.1/8

(3p) 10. So in the grand scheme of things, where do the different services, like email fit in? Using a regular mail system (the actual physical mail) as an analogy, explain how every step from writing the letter, addressing it and posting it until that it is delivered to a specific person at the delivery address correlates to the TCP/IP-model and the protocols involved.

4 Submissions

This assignment is not submitted, instead each question will be covered during a lecture.

References

[1] Mark A. Dye and Allan D. Reid. *Introduction to Networks – Companion Guide.* Cisco Press, 2014. ISBN 978-1-58713-316-4.