Uppsala University

Department of Computer Systems (DoCS)

Final Examination

Dec 15, 2000

DVP (Datakommunikation)

Data Communication and Networks

INSTRUCTIONS TO CANDIDATES

- This is a FIVE (5) hour examination
- Answer all questions
- All questions to be answered in English, Swedish or French.
- Dictionaries are Permitted
- The exam has 7 questions on 3 pages
- Marks total 50, 30-39 = G, 40-50= VG.

Question 1

TCP and UDP are the transport level services provided to applications by the TCI/IP protocol stack.

a. Describe the type of service provided by each of UDP and TCP and describe the type of application that might use TCP or UDP.

[2]

b. Do you think that UDP an appropriate service type to place in the Transport Layer according to the OSI specification? Why? Why not?

[2]

c. Consider what happens when terminating a transport layer (TCP) connection. Show how timers are used and PDU's exchanged by TCP to achieve termination over an unreliable connection. Draw diagrams to show the possible loss situations while terminating the connection and explain your diagrams.

[6]

d. Describe how congestion can be detected, and discuss how congestion is be dealt with in TCP connections. Describe an algorithm for adjusting the TCP congestion window.

[4]

e. In what situations might a congestion detection algorithm become confused, and act incorrectly? Describe the situation, and discuss two proposals which address the problem. Comment on their elegance and efficiency.

[4]

Question 2

Network layer routing in the Internet was originally implemented using a distance vector routing protocol. Describe how distance vector routing works and describe the general process for updating routing table entries.

[3]

Distance vector routing is no longer used. Give two important reasons for replacing this protocol. What routing protocol replaced distance vector routing? How does it help to solve the two major problems you identified?

[3]

What is subnetting? Explain the concept of subnetting and give an example of two sub-networks a connecting router between them. Show the relevant network numbers and other information needed for subnetting. Show the entries in the routing table and explain their significance.

[6]

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Question 3

Describe the role of "flow specifications" in proposals for Quality of service implementation for traffic. What is a flow? Describe two approaches to QoS based on different views of where the service decisions should be made.

[4]

Question 4

What is a spanning tree? How are spanning trees used to optimise communication in networks?

[2]

Question 5

Describe how a token bucket works. What is a token bucket used for?

[4]

Question 6

Describe the basic concept of how fibre optical communication works, and discuss the advantages and disadvantages of replacing existing media with optical fibre.

[4]

Optical fibre can be joined in a number of ways discuss the advantages and disadvantages of the various joining techniques.

[2]

Question 7

Modelling of protocols can be conducted using Petri-Nets. Describe the elements that make up a Petri-Net, and show their graphical representations.

[2]

What does a reachability graph represent? If you are given a reachability graph, what features can you look at and what do they tell you about a system?

[2]