

Universitetet i Agder
Fakultet for teknologi og realfag

EXAMINATION

Course code: IKT436
Course title: Advanced Internet Services and Protocols

Date: 16/12/2016
Time, from - to: 0900-1300

Number of pages including
front cover: 3

Permitted equipment: None

Comments: Answers can be written in English or in Norwegian.

1. IPv6:
 - 1.1. Which one of the following address is a valid global unicast IPv6 address? Which one is not valid? Which ones are multicast addresses? (6 points)
 - fe80::123e:w2
 - 2001:db8:3c4d:15::1a2f:1a2b
 - 2001:asbd::12::1b2s:1acb
 - ff02::1
 - ff02::1:ffef5:0
 - fe80::a100:54FF:FEF5:0
 - 1.2. Here is a MAC address of an interface: C2:00:54:F5:00:00. Generate a Link-local unicast address based on this MAC address. (6 points)
 - 1.3. How is “broadcast” done in IPv6? What is the address for the link scope multicast for all nodes? (4 points)
2. Mobility:
 - 2.1. Give two typical differences between Mobile IPv4 and Mobile IPv6? (6 points)
 - 2.2. What is network mobility? (6 points)
3. Voice over IP (VoIP) and Session Initiation Protocol (SIP):
 - 3.1. INVITE and BYE are both SIP methods. Do they usually follow the same path to destination? Explain your answer. (6 points)
 - 3.2. Can one session have many connections associated with it? Can you give an example? (6 points)
4. Quality of Service (QoS) and queuing:
 - 4.1. Give two potential problems if we apply IntServ to a large-scale network (4 points)
 - 4.2. Can DiffServ provide end-to-end guaranteed QoS? Explain your reasons. (4 points)
 - 4.3. Describe in brief the concept of ECN. (6 points)
5. Discrete Time Markov Chain (DTMC)
 - 5.1. Suppose that there are five places one would like to go for birthday celebration, which we call A, B, C, D, and E. Customers tend to stick to the same place. Those who choose place A will choose it in the next year with probability 0.8; those who choose place B will choose in the next year with probability 0.7. The probabilities for places C, D, and E are given by 0.75, 0.7, and 0.6, respectively. When customers do change the place, they choose one of the other four places with the equal probably. This process can be modeled by a Markov chain. Give the transition probability matrix. (6 points)
6. Continuous Time Markov Chain (CTMC)
 - 6.1. A drop-tail queuing has a queue length L . The arrival process follows Poisson process with rate λ . The service time follows exponential distribution. There are k servers each of which has a service rate μ/k . What is the probability of the system being idle

(i.e., no service exists in the system)? (8 points)

7. Multi-Protocol Label Switching (MPLS)

7.1. How can MPLS support VPN? (8 points)

7.2. What is label distribution in MPLS? (6 points)

8. Network management and software defined network (SDN)

8.1. Give two advantages of applying SDN. (8 points)

9. Network applications

Select *one* of the following questions to answer. If multiple questions are answered, only the first one will be evaluated (10 points)

9.1. What is Web crawler and why it is important for a searching engine? Give two crawling policies.

9.2. Give 4 technical challenges in mobile social networks.

9.3. Explain the concept of anycast and give an example of its application in a content distribution network.