

Instructions for TDTS04/11/06 exam (closed books, at LiU), 4 hours

1. Please write your answers in English. Each question has the target answer length listed (0.5-1 pages). The average one spaced page usually contains about 3000 characters or 500 words.
2. No material except an approved dictionary and calculator is allowed.
3. The grading is U, 3, 4, 5 based on the correctness and clarity of answers, displayed understanding of the material, and how close are the answers to indicated page limit.

1-page questions - 10 points, 0.5 page – 5 points. Grade limits 20; 28; 36 points out of 40.

4. Emergency contact: Prof. Andrei Gurtov, gurtov@acm.org, +46700850566, skype: gurtov
5. Good luck!

Possible exam questions

The exam will include 3 long + 2 short questions randomly chosen

Long questions (1 page)

1. Why do we need protocol layering? Describe the role of each layer.
2. Describe the functioning of HTTP protocol. Summarize different versions.
3. Describe how confidentiality and integrity can be provided for email messages.
4. Compare recursive and iterative DNS resolvers. What are security challenges in DNS?
5. Compare go-back-N vs selective repeat mechanisms. Which one is used in TCP?
6. List most common Internet applications and explain which transport protocol they use and why.
7. Describe 7 "bad things" that can happen with a packet on the Internet. What are solutions to those problems?
8. Compare packet switching with circuit switching.
9. Explain the role and functioning of ARP. What is equivalent for IPv6?
10. Describe typical architectures and functions of a router.
11. What is broadcast, unicast, multicast, anycast and flooding?
12. Explain the concept of SDN.
13. Compare link state vs distance vector routing.
14. Describe slow start and fast retransmit mechanisms in TCP Reno.
15. Why is IPv6 needed, differences to IPv4, what is adoption status?
16. Describe CSMA/CD and difference to CSMA/CA.
17. Describe the role and working of BGP.
18. Compare the use of TCP vs UDP for streaming.
19. How to compute the optimal value of a retransmission timeout?
20. How certificates are used to secure WWW?
21. What is user mobility and how it is implemented in WLAN vs cellular networks?
22. What is congestion collapse, how it can be avoided? Is TCP or UDP a fair protocol?
23. What are different approaches for Medium Access Control?
24. What is the longest prefix matching and how it is used?
25. Compare the properties of symmetric vs asymmetric cryptography.
26. Describe the source and effect of queuing, propagation, transmission delays.
27. Describe the evolution of telecommunication networks from 1G to 5G.
28. What information and how a host obtains via DHCP?
29. Describe the role and functioning of a NAT.
30. Explain how is a web page with 3 local and 3 remote images is downloaded by a web browser using persistent connections with pipelining?

Additional long questions on Distributed Systems (TDTS04)

1. What are main design goals in DS?
2. What are main types of communication in DS?
3. Explain the concept of time in DS and how clocks are synchronized.

Short questions (0.5 page):

1. How do config errors made in OSPF vs BGP affect Internet operation?
2. How does a self-learning switch make its table?
3. What is encapsulation/decapsulation and tunneling?
4. Compare P2P versus client-server model. What are strong & weak sides?
5. What is packet fragmentation and how it is handled in IPv4 vs IPv6?
6. Describe the differences between flow and congestion control.
7. What is an MTU, typical values, difference to MSS?
8. Explain the functioning of HTTP Adaptive Streaming.
9. What is a network prefix, give an example for a subnet of 255 hosts.
10. How bit errors are detected in link vs network vs transport layer protocols?
11. What are differences of TLS vs IPsec?
12. Which problem is the poison reverse solving and how?
13. What are properties of CDMA and where is it used?
14. What are classes of multimedia applications?
15. How is the hidden terminal problem solved?
16. What are pros and cons of Generalized Forwarding?
17. Describe the principle behind store-and-forward. The optimal packet size?
18. What are CDNs, why those are needed, what are common examples?
19. Summarize modern standards for encryption and hash algorithms.
20. How is decreasing SNR affects the choice of signal encoding and reception?

Additional short questions on Distributed Systems (TDTS04)

1. Describe functioning of Map-Reduce.
2. Compare structured vs unstructured P2P systems, give examples.