Hjälp

# Försättssida för: TDTS06/TEN1 går den 2011-10-22 (8-12) i Linköping.

Byt till... Välj

[ Se bokade lokaler | Se beställningen ]

## Fyll i uppgifter för försättsbladet

| | |
|---|---|
| **Datum för tentamen** | 2011-10-22 |
| **Sal (2)**<br>Om tentan går i flera salar ska du bifoga ett försättsblad till varje sal och ringa in vilken sal som avses | KÅRA T1 |
| **Tid** | 8-12 |
| **Kurskod** | TDTS06 |
| **Provkod** | TEN1 |
| **Kursnamn/benämning**<br>**Provnamn/benämning** | Datornät<br>En skriftlig tentamen |
| **Institution** | IDA |
| **Antal uppgifter som ingår i tentamen** | 14 |
| **Jour/Kursansvarig**<br>Ange vem som besöker salen. | Niklas Carlsson |
| **Telefon under skrivtiden** | 013-282644 |
| **Besöker salen ca kl.** | Kl. 9 samt Kl. 11 |
| **Kursadministratör/kontaktperson**<br>(namn + tfnr + mailaddress) | Madeleine Höger Dahlqvist<br>013-282360 |
| **Tillåtna hjälpmedel** | Inga |
| **Övrigt** | |
| **Vilken typ av papper ska användas, rutigt eller linjerat** | |
| **Antal exemplar i påsen** | |

TDTS06 – Computer networks (TEN1)
Final Examination: 8:00-12:00, Saturday, October 22, 2011
Time: 240 minutes
Total Marks: 40
Grade Requirements: three (20/40); four (28/40); and five (36/40).
Assistance: None (closed book, closed notes, and no electronics)
Instructor: Niklas Carlsson

**Instructions:**

- Read all instructions carefully (including these)!!!!
- The total possible marks granted for each question are given in parentheses. The entire test will be graded out of 40. This gives you 10 marks per hour, or six minutes per mark, plan your time accordingly.
- This examination consists of a total of 14 questions. Check to ensure that this exam is complete.
- When applicable, please explain how you derived your answers. Your final answers should be clearly stated.
- Write answers legibly; no marks will be given for answers that cannot be read easily.
- Where a discourse or discussion is called for, be concise and precise.
- If necessary, state any assumptions you made in answering a question. However, remember to read the instructions for each question carefully and answer the questions as precisely as possible. Solving the *wrong* question may result in deductions! It is better to solve the *right* question incorrectly, than the *wrong* question correctly.
- Please write your AID number, exam code, page numbers (even if the questions indicate numbers as well), etc. at the top/header of each page. (This ensures that marks always can be accredited to the correct individual, while ensuring that the exam is anonymous.)
- Answers can be provided in either English or Swedish. (If needed, feel free to bring a dictionary from an official publisher. Hardcopy, not electronic!! Also, your dictionary is not allowed to contain any notes; only the printed text by the publisher.)
- Good luck with the exam.

TDTS06 – Computer networks
Final Exam: 8:00-12:00, Saturday, October 22, 2011

### 1) Question: Encapsulation (4)

Show the link-layer frame for a small HTTP request (that fits in a single frame) when it is just to be passed down to the physical layer at the requesting host. You do not have to show all the details of the different headers; however, you should (i) explain what protocols the different headers are associated with, and (ii) provide the address information associated with the source and destination fields for each of the different headers. You can assume that the source machine uses 802.11, have a MAC address AA:AA:AA:AA and an IP address 111.111.111.111; the MAC and IP addresses of the closest router are BB:BB:BB:BB and 111.111.111.222; the MAC and IP addresses of the access point that the client is associated are DD:DD:DD:DD and 111.111.222.222; and finally, the MAC and IP addresses of the HTTP server are CC:CC:CC:CC and 222.222.222.222.

### 2) Question: WWW (1)

How are the WWW and the Internet related? Also, please put your answer in the context of the protocol stack.

### 3) Question: BitTorrent (3)

One of the more important mechanisms in BitTorrent is the rate-based tit-for-tat policy. Please explain BitTorrent's unchoke rule, as well as the importance of optimistic unchoking.

### 4) Question: TCP fairness (3)

Please explain (and show) how the throughput of two TCP flows with the *different* round trip time (RTT) converges as they compete for the bandwidth of a shared link. You should assume that the one connection has twice the RTT of the other, and that they share the same bottleneck link. (Again, an illustration will help.)

### 5) Question: TCP slow start (4)

Consider two machines A and B which are located 100ms apart. Assume that A is requesting a file from B using HTTP. Draw a figure and explain the entire communication sequence, including TCP handshake and connection teardown. You can assume that the payload is 20 packets and each packet can be sent in 1ms. You should consider two scenarios. (a) Assume no packet losses. (b) Assume that payload packets 4, 8, 9, and 11 are lost. For simplicity, you can assume that the TCP version is implementing fast retransmit, initially have a large ssthresh, and the timeout period is constant at 300ms.

### 6) Question: Forwarding vs routing (2)

What is the difference between forwarding and routing in the IP layer?

### 7) Question: Switching fabric (2)

Give an example when queuing happens at an output port of a router. Please support your answer with a figure.

### 8) Question: Distance vector routing (4)

Consider a node A with neighbors B, C, and D. Node A currently has the distance table below. Assume that it receives an updated distance vector from neighbor B which looks as follows [∞, 0, 1, 1, 8, 9, 2]. First, update the table below, including A's own distance vector. Second, assume that poison reverse is implemented, and explain what information the node sends to each its neighbors (after the table has been updated).

| | Costs | | | |
|---|---|---|---|---|
| Destination | A (via) | B | C | D |
| A | 0 (A) | ∞ | ∞ | ∞ |
| B | 1 (B) | 0 | 1 | 1 |
| C | 1 (C) | 1 | 0 | 1 |
| D | 1 (D) | 1 | 1 | 0 |
| E | 8 (C) | 8 | 7 | 8 |
| F | 9 (C) | 9 | 8 | 9 |
| G | 10 (C) | 10 | 9 | 10 |

### 9) Question: DHCP+ARP (4)

Assume that you are a wireless user, just arrived to a new network, want to access some service provided at an external machine accessible over the Internet, and the local area network is using DHCP. First, explain the steps for obtaining an IP address. Now, given that you have an IP address and want to send packets to other machines over the Internet, you also need to obtain the MAC address of at least one network entity. Please explain what entity that is, as well as the steps to obtain the MAC address of that entity.

### 10) Question: 802.11 (3)

The 802.11 protocol can handle some hidden-terminal problems using the RTS-CTS mechanism. Please explain the following: (a) What is the hidden-terminal problem? When and how does it occur? (b) How does the RTS-CTS mechanism help towards solving the hidden-terminal problem?

### 11) Question: Packet losses (3)

Packet losses are common in wireless networks. Forward-error correction (FEC) and interleaving are two common techniques to handle such losses. Please explain how interleaving works, as well as what some of the advantages and disadvantages of this technique is.

### 12) Question: QoS (3)

Please explain and illustrate how the leaky-bucket approach can be used to control the average send rate and the maximum packet burst of a flow.

### 13) Message integrity and authentication (4)

Consider a sender Alice who wants to send a large message over the network to a receiver Bob in a way that allow Bob to verify that the message was sent by Alice and nobody else (including Trudy) modified the message. You can assume that Alice and Bob have "trusted" copies of each other's public keys, as well as a common hash function (e.g., SHA-1). However, they do **not** have a shared secret key. Further, assume that it is a large message and Alice and Bob do **not** want to use public key cryptography for the message delivery itself. Instead they want to use the message authentication (MAC) approach described in the textbook and in class (which requires the use of a common hash function plus a shared secret key). Explain how this service can be provided. Please support your solution with a figure.

### 14) Question [Bonus]: Chord (4)

Assume a fully populated chord circle (in which there is one node per value), with a total of 128 values. Further assume that each node keeps track of its successor, its predecessor, and their full finger tables. Please provide the route taken to route from node 80 to 69. (Reminder: Please show your work!!)

Good luck!!