



Försättsblad Prov Original

Kurskod	Provkod	Tentamensdatum
D T 1 5 3 G	T 1 0 4	2 0 1 8 - 1 0 - 3 1
Kursnamn	Datateknik GR (A), Nätverksteknik A	
Provnamn	Skriftlig tentamen	
Ort	Sundsvall	
Termin	H18	
Ämne	Datateknik	



Mittuniversitetet
MID SWEDEN UNIVERSITY

Final Exam

DT153G Network Technology A

Magnus Eriksson

magnus.eriksson@miun.se

Phone: 010 142 8740

Lennart Franked

lennart.franked@miun.se

Phone: 010 142 8683

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Instructions

Carefully read the questions before you start answering them. Note the time limit of the exam and plan your answers accordingly. Only answer the question. The questions are *not* sorted by difficulty. Clearly show which answer you are giving your solution to. *Always motivate your answers and show your calculations.*

Time 5 hours.

Exam Aids Dictionary.

Maximum points 30

Questions 10

Preliminary grades

The following grading criteria applies: E \geq 30%, D \geq 45%, C \geq 60%, B \geq 75%, A \geq 90%. Scoring will be based on level of depth shown in your answer. To pass this exam you must have shown proficient knowledge in all the intended learning outcomes (ILO) covered in this exam. Each questions ILO affiliation is shown as (ILO: #). The grade limit given is preliminary per ILO. Final grade is set based on your performance on each individual ILO.

Covered ILO

This exam covers the following Intended Learning Outcomes (ILO)

- ILO: 1 – Describe the different levels in the TCP/IP and OSI models.
- ILO: 3 – Calculate IP addresses and subnet masks.
- ILO: 4 – Calculate bandwidth capacity and usage.
- ILO: 5 – Compare common routing protocols that are used within autonomous systems.
- ILO: 6 – Discuss and apply different technologies for reducing the need of public IPv4 addresses.
- ILO: 7 – Calculate access lists for controlling access to network functions and segments.

Questions

The questions below are not given in any particular order.

- (3p) 1. (*ILO: 1*) Switches can operate in multiple layers in the TCP/IP model. Compare switching in layer two, three and four.
- (3p) 2. (*ILO: 1*) Using a web traffic connection between a client and a server as a reference. For each layer in the TCP/IP model, place the correct header type, along with the sender and receiver addresses used. You can make up the addresses yourself.
- (3p) 3. (*ILO: 3*) Subnet the 18.10.31.0/18 network such that the following criteria is met.
- There should be one network that can hold 8000 hosts
 - There should be three networks that can host 2000 hosts
 - There should be three networks that can hold 500 hosts
 - There should be four networks that can hold 2 hosts (point-to-point links)

How many usable ip-addresses will there be left after you have performed the subnetting?

- (3p) 4. (*ILO: 4*) If we wanted to send 100 bytes of data between two hosts, what would the difference in overhead be (in bytes) if we where to use TCP instead of UDP (assume there are no options added in the header)?
- (3p) 5. (*ILO: 4*) Show all calculations:
- (a) Assume that you are watching a 2 Gbyte movie clip of 50 minutes play time. How large network goodput (application layer throughput, exclusive of headers) in Mbit/s is required to allow full quality streaming without stalling?
 - (b) Assume that up to eight people may be watching the same video simultaneously using multi-casting. How large network goodput in Mbit/s is required from the video server?
 - (c) Assume that the video stream is transferred over UDP with an 8 byte header per UDP datagram, over IPv4 packets with 20 bytes header per IP packet, and over Ethernet with Ethernet payload of 974 bytes, and 26 byte overhead (header, trailer and interframe gap) per Ethernet frame. What throughput (inclusive of headers, measured between the physical layer and the data link layer) should be delivered to one user for full quality streaming?
- (3p) 6. (*ILO: 5*) Define classful and classless routing protocols, what is the difference between this and classful and classless adressing? Why is this important for you to know?
- (3p) 7. (*ILO: 5*) There are numerous ways a router can learn about how to reach a network. List and categorize those ways that we have covered in this course. Discuss how the router decides which path is best, when learnt from multiple sources.
- (3p) 8. (*ILO: 6*) Discuss three methods used for a client to obtain an IPv6 address.
- (3p) 9. (*ILO: 6*) Discuss the following:
- What inside, outside, global and local means when speaking of NAT
 - Account for at least two problems that NAT introduces into a network
- (3p) 10. (*ILO: 7*) Create one access list that includes **only** one ip address and one wildcard mask, such that it will only permit the addresses given below. Confirm that your ACL work.
- All odd ip addresses in the subnet 252.175.13.0/24