Mittuniversitetet
MID SWEDEN UNIVERSITY

Försättsblad Prov Original

Kurskod	Provkod	Tentamensdatum
DT052A	T101	2019-01-16

Kursnamn	Datateknik AV, TCP/IP-nät
Provnamn	Tentamen
Ort	Sundsvall
Termin	
Ämne	

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Final Exam

DT052A, DT066A TCP/IP Internetworking

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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, do not write about subjects remotely related to 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 Non-programmable calculator..

Maximum points 30

Questions 10

Preliminary grades

The following grading criteria applies: E $\geq$ 50%, D $\geq$ 60%, C $\geq$ 70%, B $\geq$ 80%, A $\geq$ 90%.

Covered ILO

This exam covers the following Intended Learning Outcomes (ILO)

- ILO: 1 – analyze, apply and evaluate the TCP / IP family protocols
- ILO: 2 – explain and evaluate routing protocols used for unicast and multicast on the Internet
- ILO: 3 – describe methods and categorize problems related to reliable transport, time delay, flow control and traffic congestion management
- ILO: 4 – design and evaluate a simpler network
- ILO: 5 – explain and apply the principles of queue theory related to QoS and switching
- ILO: 10 – describe and reflect on technologies for wireless communication on the Internet
- ILO: 11 – Evaluate and compare security solutions for communication based on the internet model

Questions

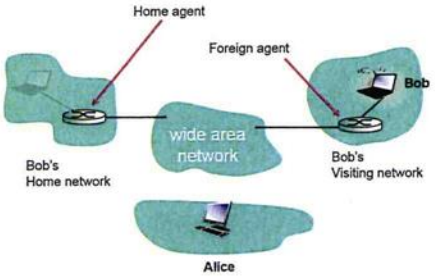
The questions below are not given in any particular order.

(3p) 1. *(ILO: 1)* Why do we need multiple access protocols? Elaborate and explain. Give one example of a channel partitioning protocol and one example of a random access protocol.

(3p) 2. *(ILO: 1)* Elaborate on the difference between a client-server and a Peer-to-per architecture. What are the differences? Give examples of use for the two.

(3p) 3. *(ILO: 10)* What is the basic difference in 3G and 4G cellular network architecture?

(3p) 4. *(ILO: 10)* Assume that Alice wants to communicate with Bob, while Bob is currently residing in a network that is not his home network. How Alice can communication with Bob in the visiting network using indirect routing? List and clearly state all the steps needed to connect Alice to Bob.



(3p) 5. *(ILO: 11)* Explain symmetric encryption. Give an example of when symmetric encryption is used in secure data transfer. Discuss some problems that might arrise if asymmetric encryption would be used instead in the example you mentioned.

(3p) 6. *(ILO: 2)* Subnet the 18.10.16.0/20 network such that the following criteria is met.

- There should be one network that can hold 2000 hosts
- There should be two networks that can host 500 hosts
- There should be three networks that can hold 128 hosts
- There should be four networks that can hold 2 hosts (point-to-point links)

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

(3p) 7. *(ILO: 3)* What is the relationship with congestion window and receive window? Explain how each is set.

(3p) 8. *(ILO: 3)* What mechanism is available for TCP to ensure that the receiver will receive data in a pace that it can handle?

(3p) 9. *(ILO: 4)* Explain some of the reasons behind the success of Ethernet.

(3p) 10. *(ILO: 5)* The packet switching network in Figure 1 on the next page is used to transmit three unicast UDP streams S_1, S_2 and S_3. Let S_1 be the stream from A to C, S_2 the stream from A to D, S_3 the stream from B to E. There is no packet loss in the network. We measure the average and maximum end-to-end delay for each of the three streams. The average end-to-end delays are $T_1 = 120$ ms, $T_2 = 100$ ms and $T_3 = 200$ ms, the maximum end-to-end delays are $\widehat{T}_1 = 150$ ms, $\widehat{T}_2 = 180$ ms and $\widehat{T}_3 = 225$ ms. Given that the average packet generated per second by S_1 and S_2 are respectively $\lambda_1 = 100$ packet/s and $\lambda_2 = 80$ packet/s; find the average number of packets of S_1 and S_2 that are in the network.
Next assume that the average number of packets in the network is 25, and that there is no other traffic outside of the three unicast streams; find the number of packet generated in a second by stream S_3.

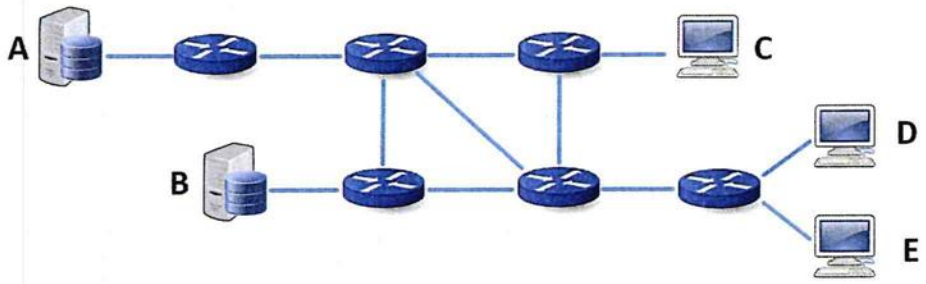


Figure 1: Packet Switching Network