— Student name:……Student number:…… —

Netwerken en Systeembeveiliging
Theory – Dec 17 2014

Dear student,

- This exam consists three parts on different topics we covered during the course.
- The total number of points is 90 points (+ 10 points baseline). Each part/question indicates how many points you get for a correct answer.
- Read all the questions carefully. Write in a readable way. You can write in Dutch if you prefer to do so.

Part A – Multiple choices *(Provide these directly in the exam sheets.)*

Question 1.1 ***(2.5 pts) Fill in the blanks***

The …….. header contains information needed by the network layer protocols.

The …….. header contains information needed by the transport layer protocols.

DSCP requires to use …….. bits in the IPv4 header.

An IPv6 address consists of …….. bits.

IP address 132.45.23.4/25 belongs to the subnet: ……..

Question 1.2 ***(2.5 pts): True or false?***

UDP is a connection-oriented protocol. ……..

SYN flooding attacks require attackers to send 'large' packets to the target. ……

CSMA/CD can be used in wireless/radio environments. ……..

The BGP AS Path (230,34,56,241,23) contains a routing loop. ……..

Ethernet frames contain a header and a trailer. ……..

Question 1.13 (*5 pts) Match the right answers.*

Which protocol? ARP, DHCP, DNS, ICMP, NAT?

…….. provides the mapping between IP addresses and domain names.

…….. provides the mapping between MAC addresses and IP addresses on a LAN.

…….. provides translation mechanisms between IP addresses in different prefixes.

…….. provides an IP address to a host joining a network.

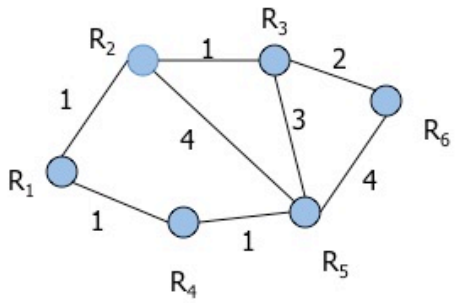
…….. provides information about a destination being unreachable.

Part B – Problems

(Provide these directly in this exam sheets)

Question B.1 ***(10 points)***

Assume the routers in the drawing run OSPF.



Show how the path finding algorithm running in router R5 will determine the shortest path tree, after the router has received full information on the topology from its neighbors.

Step	Tree set	D(R1) p(1)	D(R2), p(2)	D(R3),p(3)	D(R4),p(4)	D(R6),p(6)

Question B.2 ***(6 points)***

Consider two hosts, A and B connected by a single link of rate ***R*** bps. The hosts are separated by ***m*** meters and the propagation speed along the link is ***s*** meters per second. A host sends a packet of size ***L*** bits to B.

- What is the propagation delay *dprog*?

  ……

- What is the transmission time *dtras?*

  ……

- What is the end to end delay if there is no queueing delay and processing delay?

  ……

Question B.3 *(10 points)*

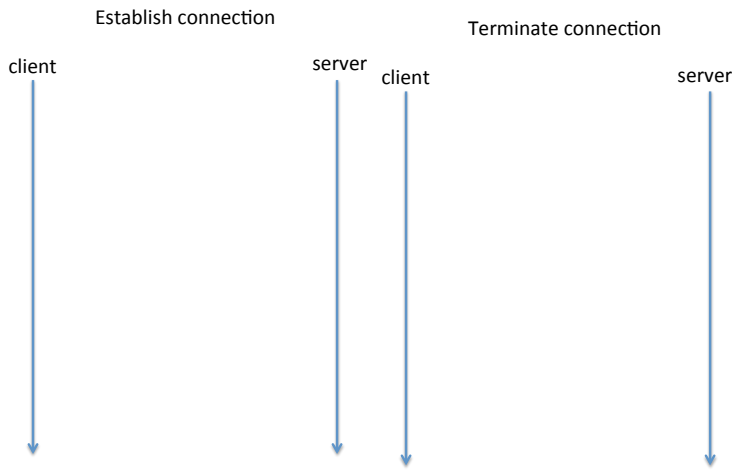
Transmission through an interface of speed *M=1gbps* is regulated by a token bucket algorithm. The bucket is filled at a rate *R=0.5Gbps*. The bucket is initially fully filled, at capacity *C=8 gigabits.* How long can you send traffic at the full interface speed *M=1gbps?*

……

……

Question B.4 *(14 points)*

Indicate in the diagram below which messages are exchanged between client and server to ***establish*** and to ***terminate*** a TCP connection. Indicate for each segment the value of the FLAGS turned on (*ignore the values of the sequence numbers*).



Topic C – Review questions *(Provide these answers in a separate exam sheet. Write clearly. Be concise.)*

Question C.1 *(10 points)*

What are the functions of the data-link layer?

Question C.2 *(10 points)*

You have the choice between implementing WFQ (Weighted Fair Queuing) and WRR (Weighted Round Robin). Compare the two strategies and highlight the pros and cons of each one of them.

Question C.3 *(10 points)*

What is a hidden terminal in a 802.11 environment? How would you solve communication problems due to hidden terminals?

Question C.4 *(10 points)*

Explain how TCP flow control works. How can you modify the flow control parameters and why would you consider doing this?