OLLSCOIL NA hEIREANN, CORCAIGH
THE NATIONAL UNIVERSITY OF IRELAND, CORK

COLAISTE NA hOLLSCOILE, CORCAIGH
UNIVERSITY COLLEGE, CORK

2015/2016

Autumn Examinations 2016

CS2505 – Network Computing

Dr. H. Purchase
Professor C. J. Sreenan

Answer all Questions.
Total Marks 80

1.5 hours

The use of electronic calculators is permitted.
Please clearly label your answer to each question and sub-question.

PLEASE DO NOT TURN THIS PAGE UNTIL INSTRUCTED TO DO SO

ENSURE THAT YOU HAVE THE CORRECT EXAM PAPER

Question 1: General Networking Concepts [20 marks]

a) For each sub-question below answer either *True* or *False*. *[10 marks]*

i. Packet switching in the Internet is based on the concept of statistical multiplexing.

ii. There are 6 layers in the OSI network architecture.

iii. Transport-layer demultiplexing in the Internet is based on the use of port numbers.

iv. Congestion is said to occur when queues in routers overflow.

v. The UDP header includes a sequence number.

b) Give concise definitions for the following terms: link bandwidth, throughput, latency, router, protocol. *[10 marks]*

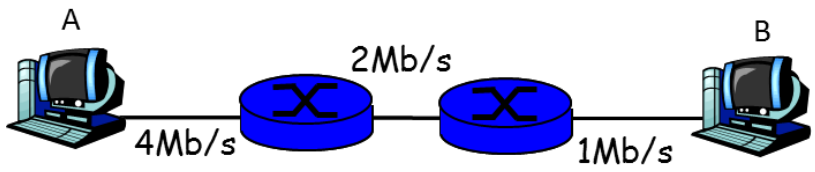
Question 2: Networking Fundamentals [20 marks]

a) What are the five layers of the Internet protocol architecture? For each layer, give one sentence explaining its principal responsibilities. *[10 marks]*

b) For the network shown below:

i. Identify the "bottleneck" link. *[2 marks]*

ii. Calculate the total delay in milliseconds for a packet of size 2048 bytes to travel from host A to host B. Assume a fixed queuing delay in each router of 2 milliseconds, and a propagation delay on each link of 1 millisecond. Make sure to clearly show and explain your calculations. *[8 marks]*



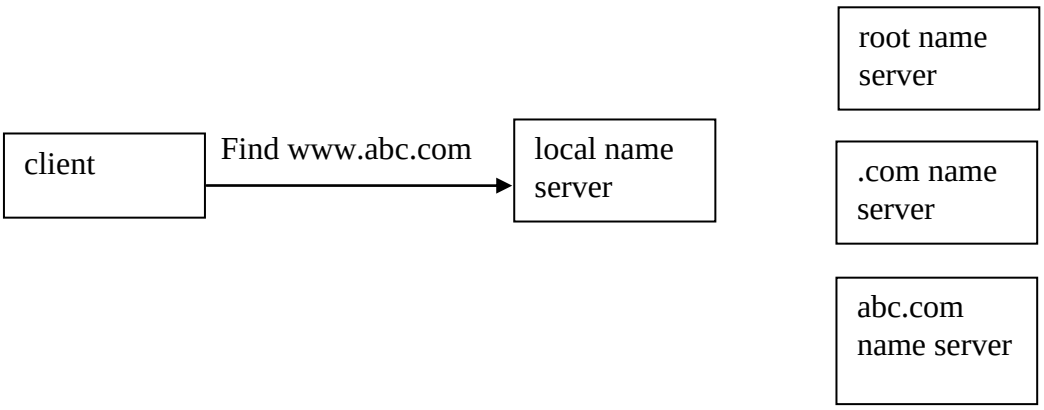
Question 3: Application Layer [20 marks]

a) In regard to the Domain Name System (DNS):

i) Explain the difference between type A and type NS records. *[4 marks]*

ii) Copy the following figure into your answer book and use it to explain how the name of host www.abc.com is resolved to its corresponding IP address using iterated mode. Be sure to give sufficient detail in your answer to explain

what actions are taken at each step of the process you describe, paying particular attention to the effect of when an entry is already cached. *[6 marks]*



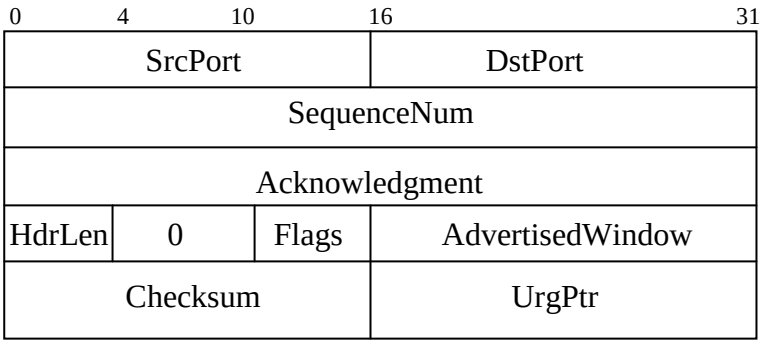
b) In regard to video streaming:

i. Explain the need for a playout buffer in a video streaming player. *[4 marks]*

ii. A DASH player operates by requesting video in chunks from a server. In making each such request, briefly explain the *three* key decisions that the player must make. *[6 marks]*

Question 4: Transport Layer [20 marks]

a) The figure below shows the TCP header (without options). For each field briefly explain how its value is determined and how it is used. *[10 marks]*



b) In regard to reliable delivery:

i) You are asked to specify a simple unidirectional stop-and-wait reliable transport layer protocol to operate over a link that can corrupt packets but never loses a packet. Give the sender and receiver finite state machines for such a protocol. Assume that bit errors can only affect data packets (i.e. from the sender). *[8 marks]*

ii) Briefly explain how you would change your protocol if bit errors can affect packets from both sender and receiver. *[2 marks]*