THE PAPUA NEW GUINEA UNIVERSITY OF TECHNOLOGY

DEPARTMENT OF ELECTRICAL AND COMMUNICATIONS ENGINEERING

FIRST SEMESTER EXAMINATION (2021)

EE314 Data Communications and Networking and
EE461 Computer Communication

THIRD YEAR (COMMUNICATION) BEEC 3
FOURTH YEAR (COMMUNICATION) BEEC 4

TIME ALLOWED: 3 HOURS

INFORMATION FOR STUDENTS

1. You have **TEN (10) MINUTES** to read the paper. You must not begin writing during this time.
2. **Answer all questions.**
3. All answers must be written in the **ANSWER BOOK** supplied.
4. **COMPLETE THE DETAILS REQUIRED ON THE FRONT COVER OF YOUR ANSWER BOOK – DO THIS NOW.**
5. Only drawing instruments and calculators are permitted on your desk. Textbooks and notebooks are **NOT** permitted.
6. If you are found cheating in the Examination, the penalties specified by the University shall apply.
7. TURN OFF all Mobile Phone and place them on the floor under your seat before the start of Examination.

QUESTION ONE General [10 Marks]

In computer networking, it is processes or applications running on end systems which communicate with each other. With regard to a network application or program, and getting its data from the source end system to the destination end system, clearly explain each of the following:

A) What is a MAC address, IP address and port number and what role does each play in network communication from an end-to-end routing perspective? **[3 marks]**

B) What is an API and explain its role in the development of network applications? **[2 marks]**

C) List 4 types of delays experienced by a packet. **[2 marks]**

D) What is encapsulation and why is it necessary? **[3 marks]**

QUESTION TWO Applications [10 Marks]

Data communication is all about processes on different end systems talking to each other or effecting data exchanges between them. In relation to these data exchanges:

A) What are the two predominant application architectures used by software developers when creating network applications for end systems, and give one example each of applications that use these architectures? **[2 marks]**

B) What is the importance and role of network or communication protocols? **[4 marks]**

C) If one of the two end systems communicating is a server, would you assign it a static or dynamic IP address (via DHCP) and explain why you would do so. **[2 marks]**

D) Data networks use packet switching while telephone networks use circuit switching. Explain the difference between packet switching and circuit switching. **[2 marks]**

QUESTION THREE TCP and UDP [10 Marks]

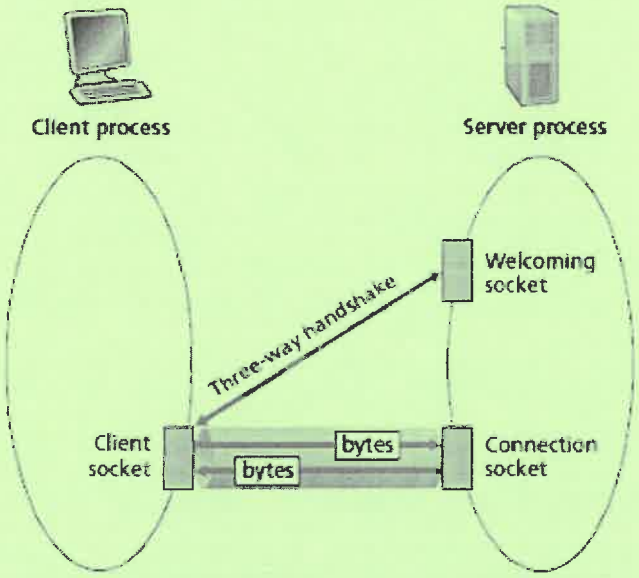


Figure 2.29 The TCP Server process has two sockets.

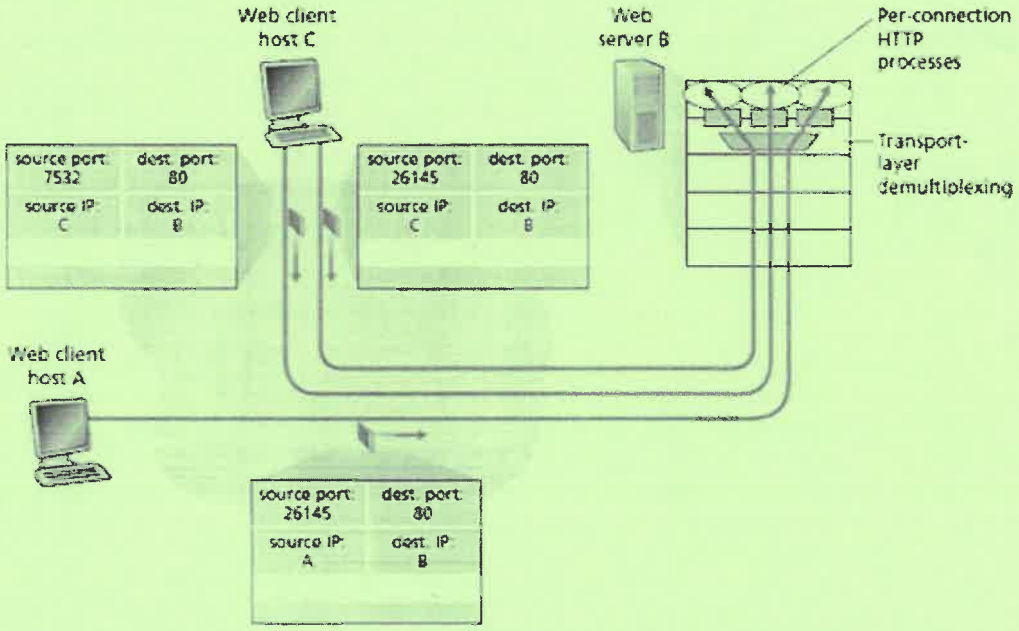


Figure 3.5 Two clients, using the same destination port number (80) to communicate with the same Web server application.

Using Figure 2.29 and Figure 3.5 above as reference,

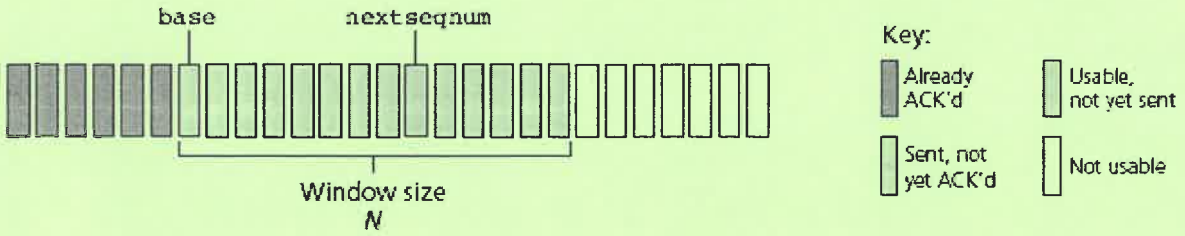
A) Clearly explain connectionless demultiplexing. [**4 marks**]

B) Clearly explain connection-oriented demultiplexing. [**4 marks**]

C) Is the connection shown in Figure 3.5 connection-oriented (TCP) or connectionless (UDP) and explain your choice of answer. [**2 marks**]

QUESTION FOUR Go-Back-N [10 Marks]

The diagram below shows the sender's view of sequence numbers in Go-Back-N. GBN is also referred to as a sliding window protocol.



For the window size shown above, explain the following:

A) What is meant by the window size and how is the window size determined? [**2 marks**]

B) Why is it that some packets in the window are coloured grey and not all packets are coloured light blue? [**3 marks**]

C) Explain what the packets labelled "base" and "nextseqnum" represent? [**2 marks**]

D) What is the requirement for the window to slide upward from the packet labelled "base" and what is meant by cumulative acknowledgment? [**3 marks**]

QUESTION FIVE IP [10 Marks]

For the network setup shown below, design a FLSM address plan given the network address 202.1.38.0/24. Show all addresses assigned to your subnets (LANs and WANs), hosts, and router interfaces. [**10 marks**]