City University of Hong Kong
Department of Electrical Engineering

EE3009 Data Communications and Networking

Assignment 1

Due Date: 12 October 2024

1. Suppose a router has four links, numbered 0 through 3, and packets are to be forwarded to the link interfaces as follows:

Destination Address Range	Link Interface
11100000 00000000 00000000 00000000 through 11100000 00000000 11111111 11111111	0
11100000 00000001 00000000 00000000 through 11100000 00000001 11111111 11111111	1
11100000 00000010 00000000 00000000 through 11100000 00000011 11111111 11111111	2
otherwise	3

   Provide the corresponding forwarding table which uses longest prefix matching.

   [2 marks]

2. For a crossbar switch, determine the maximum normalized throughput per output line when the number of inputs is 8.

   [3 marks]

3. Round-robin (RR) scheduling was referred as fair queuing (FQ) by John Nagle in 1985 when proposing RR in the gateway between a local area network and the internet to reduce network disruption from badly-behaving hosts. Whereas round-robin cycles over the queues and gives one service opportunity per cycle, weighted round robin (WRR), also referred to as WFQ, offers to each queue a fixed number of opportunities, in proportion to the weight of each connection. Figure 1 shows a link serving three incoming connections.

   a. Suppose connections A, B, and C have the same packet size, and weights 0.5, 0.75, and 1.0. How many packets from each connection should a WRR server serve in each round?

      [2 marks]

   b. Suppose connections A, B, and C have mean packet size of 50, 500, and 1500 bytes, and weights 0.5, 0.75, and 1.0. How many packets from each connection should a WRR server serve in each round?

      [3 marks]

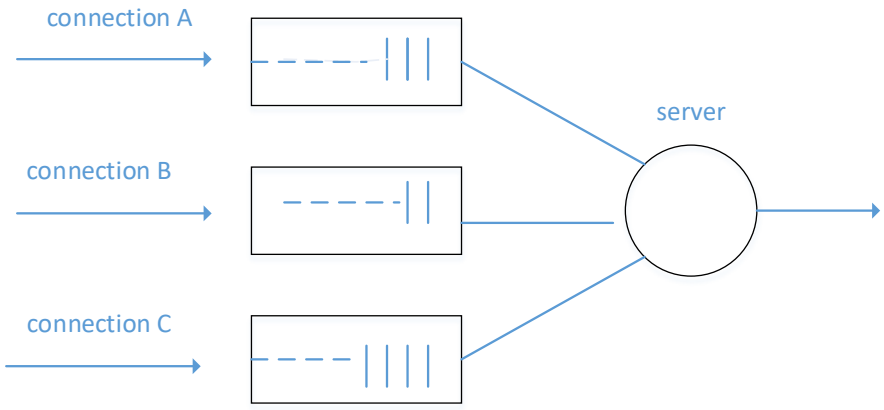

Figure 1.