

## Comp 2322 Computer Networking

### Homework Four

**Due time: 11:59pm, April 6, 2024, Saturday**

**Total marks: 10 points**

#### **Submission Requirements:**

You need to submit the homework to the blackboard via Learn@PolyU on or before the due time. Late submission will cause the marks to be deducted 25% per day.

#### **Questions:**

- 1) (4 points) Consider a network using 8-bit host addresses. Suppose a router uses the longest prefix matching and has the following forwarding table:

Prefix Match	Interface
00	0
010	1
011	2
10	2
11	3

For each of the four interfaces, give the associated range of destination host addresses and the number of addresses in the range.

Interface 0:

The range of destination host addresses is 00000000 – 00111111, Number of addresses is 64

Interface 1:

The range of destination host addresses is 01000000 – 01011111, Number of addresses is 32

Interface 2:

The range of destination host addresses is 01100000 – 01111111 and 10000000 – 10111111, Number of addresses is 96

Interface 3:

The range of destination host addresses is 11000000 – 11111111, Number of addresses is 64

- 2) (1 point) Suppose datagrams are limited to 1,000 bytes (including header) between source Host A and destination Host B due to the link has an MTU of 1000 bytes. Assuming a 20-byte IP header, how many datagrams would be required to send an MP3 file that consists of 5M bytes when using TCP? Explain how you computed your answer.

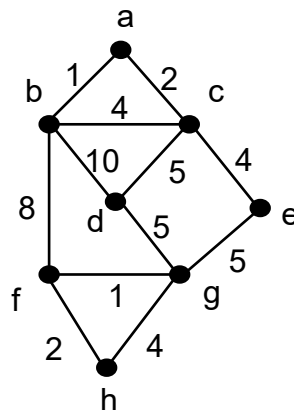
IP header and the TCP header are both 20 bytes long for each datagram

A datagram consists of TCP header, IP header and data field for the MP3 file

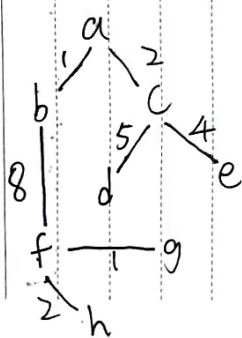
Data field for the MP3 files =  $1000 - 20 - 20 = 960$  bytes

The total number of datagrams =  $5 \text{ MB} / 960 \text{ bytes} = 5 * 10^6 / 960 \approx 5209$  datagrams

- 3) (5 points) Consider the network below. Please use Dijkstra's shortest-path algorithm to compute the shortest path from node  $a$  to all network nodes.



Step	N'	D(b), p(b)	D(c), p(c)	D(d), p(d)	D(e), p(e)	D(f), p(f)	D(g), p(g)	D(h), p(h)
Step 0	a	1, a	2, a	$\infty$	$\infty$	$\infty$	$\infty$	$\infty$
1	ab		<u>2, a</u>	11, b	$\infty$	9, b	$\infty$	$\infty$
2	abc			7, c	<u>6, c</u>	9, b	$\infty$	$\infty$
3	abce			<u>7, c</u>		9, b	11, e	$\infty$
4	abcd					<u>9, b</u>	11, e	$\infty$
5	abcdf						<u>10, f</u>	11, f
6	abcdfg							11, f
7	abcdfgh							



Destination	Link	Path	Length
b	(a,b)	ab	1
c	(a,c)	ac	2
d	(a,d)	acd	7
e	(a,e)	ace	6
f	(a,f)	abf	9
g	(a,g)	abfg	10
h	(a,h)	abh	11