**Comp 2322 Computer Networking**

**Homework Four Solutions**

**Total marks: 10 points**

**Questions:**

1. (4 points) Consider a network using 8-bit host addresses. Suppose a router uses 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.

Ans:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Prefix Match | Interface | Destination Address Range | Number of Addresses | |
| 00 | 0 | 00000000 ~ 00111111 |  | |
| 010 | 1 | 01000000 ~ 01011111 |  | |
| 011 | 2 | 01100000 ~ 01111111 |  | 32+64=96 |
| 10 | 2 | 10000000 ~ 10111111 |  |
| 11 | 3 | 11000000 ~ 11111111 |  | |

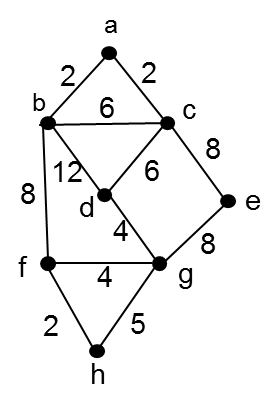
1. (1 point) Suppose datagrams are limited to 1,500 bytes (including header) between source Host A and destination Host B due to the link has an MTU of 1500 bytes. Assuming a 20-byte IP header, how many datagrams would be required to send an MP3 file that consists of 3 M bytes when using TCP? Explain how you computed your answer.

Ans:

MP3 file size is 3 MBs. Assume the MP3 file is carried in TCP segments, with each TCP segment having 20-byte TCP header and 20-byte IP header, Then each datagram can carry 1500-40=1460 bytes of the MP3 file.

Number of datagrams .

1. (5 points) Consider the network below. Please use Dijkstra’s shortest-path algorithm to compute the shortest path from node *h* to all network nodes.



Ans:

Using Dijkstra’s shortest-path algorithm for node *h*

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Step | N’ | D(a),p(a) | D(b),p(b) | D(c),p(c) | D(d),p(d) | D(e),p(e) | D(f),p(f) | D(g),p(g) |
| 0 | h | ∞ | ∞ | ∞ | ∞ | ∞ | 2,h | 5,h |
| 1 | hf | ∞ | 10,f | ∞ | ∞ | ∞ | 2,h | 5,h |
| 2 | hfg | ∞ | 10,f | ∞ | 9,g | 13,g | 2,h | 5,h |
| 3 | hfgd | ∞ | 10,f | 15,d | 9,g | 13,g | 2,h | 5,h |
| 4 | hfgdb | 12,a | 10,f | 15,d | 9,g | 13,g | 2,h | 5,h |
| 5 | hfgdba | 12,a | 10,f | 14,a | 9,g | 13,g | 2,h | 5,h |
| 6 | hfgdbae | 12,a | 10,f | 14,a | 9,g | 13,g | 2,h | 5,h |
| 7 | hfgdbaec | 12,a | 10,f | 14,a | 9,g | 13,g | 2,h | 5,h |

Shortest path from node *h* to all networks nodes

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Destination node | a | b | c | d | e | f | g | h |
| Shortest path | hfba | hfb | hfbac | hgd | hge | hf | hg | h |