Computer Networking

Assignment 3

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Problem 1: Switching Fabrics (10 points)

1. if each input port can map to a unique output port without conflict, the minimal number of time slots would be 1.
2. if we have to wait for each datagram to clear before we can transfer the next one, the largest number of slots is equal to the number of datagrams.
3. we need the largest number of slots equal to the number of datagrams if they are all queued up in a way that causes maximum HOL blocking.

Problem 2: Packet Scheduling (10 points)

1. To achieve the WFQ weights, the sequence should prioritize Class 1 over Classes 2 and 3. The possible sequence is: 112233112233...
2. With no packets in Class 3, the sequence should reflect the adjusted weights. The possible sequence is: 112211221122...

Problem 3: IP Addressing (15 points)

|  |  |
| --- | --- |
| **Destination Network** | **Interface** |
| 192.168.1.0/24 | Link 0 |
| 192.168.2.0/24 | Link 1 |
| 192.168.3.0/24 | Link 2 |
| 192.168.4.0/24 | Link 3 |
| 0.0.0.0/0 | Link 0 |

1. The forwarding table uses the longest matching prefix to determine the correct link interface for each destination address.

|  |  |
| --- | --- |
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| 192.168.4.0/24 | Link 3 |
| 0.0.0.0/0 | Link 0 |

Problem 4: Subnet (10 points)

* 1. **Network A (250 interfaces):** 214.97.254.0/24
  2. **Network B (120 interfaces):** 214.97.255.0/25
  3. **Network C (120 interfaces):** 214.97.255.128/25
  4. **Networks D, E, F (2 interfaces each):** 214.97.255.192/28, 214.97.255.208/28, 214.97.255.224/28

1. Each router's forwarding table uses longest prefix matching to direct packets to the correct subnets.

Problem 5: SDN (15 points)

1. any datagrams arriving on input port 1 from hosts h5 or h6 that are destined to hosts h1 or h2 should be forwarded over output port 2;
2. any datagrams arriving on input port 2 from hosts h1 or h2 that are destined to hosts h5 or h6 should be forwarded over output port 1;
3. any arriving datagrams on input ports 1 or 2 and destined to hosts h3 or h4 should be delivered to the host specified;
4. hosts h3 and h4 should be able to send datagrams to each other.

Problem 6: Link State Routing (10 points)

1. Initialization:

x: 0, A: ∞, B: ∞, C: ∞, D: ∞, E: ∞

1. Select Node x:

x: 0, A: 1, B: 4, C: ∞, D: ∞, E: ∞

1. Select Node A:

x: 0, A: 1, B: 4, C: 3 (A to C), D: ∞, E: ∞

1. Select Node B :

x: 0, A: 1, B: 4, C: 3, D: 5 (B to D), E: ∞

1. Select Node D:

x: 0, A: 1, B: 4, C: 3, D: 5, E: 6 (D to E)

Final Result

To A: Distance = 1

To B: Distance = 4

To C: Distance = 3 (through A)

To D: Distance = 5 (through B)

To E: Distance = 6 (through D)

Problem 7: Distance Vector Routing (10 points)

1. To w: 0
2. To y: 0
3. To u: min(x-w-u: 5 + cost(x-w), x-y-u: 6 + cost(x-y))

Increase c(x,w) such that the path via y becomes shorter.

Decrease c(x,y) slightly without affecting the minimum path to u.

Problem 8: Border Gateway Protocol (20 points)

1. Router 3c: iBGP
2. Router 3a: OSPF
3. Router 1c: eBGP
4. Router 1d: iBGP
5. I would be I1 because the path via AS3 is likely preferred.
6. I would still be I1 if the path via AS3 is shorter.
7. I would still be I1 if the path via AS3 is shorter.