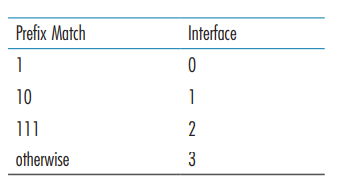
**P10. Consider a datagram network using 8-bit host addresses. Suppose a router uses longest prefix matching and has the following forwarding table:**

****

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

Interface 0

Range: 10000000 through 10111111

Number of addresses: 64

Interface 1

Range: 11000000 through 11011111

Number of addresses: 32

Interface 2

Range: 11100000 through 11111111

Number of addresses: 32

Interface 3

Range: 00000000 through 01111111

Number of addresses: 128

**P14. Consider a subnet with prefix 128.119.40.128/26. Give an example of one IP address (of form xxx.xxx.xxx.xxx) that can be assigned to this network.** **Suppose an ISP owns the block of addresses of the form 128.119.40.64/26. Suppose it wants to create four subnets from this block, with each block having the same number of IP addresses. What are the prefixes (of form a.b.c.d/x) for the four subnets?**

128.119.40.0/28

128.119.40.16/28

128.119.40.32/28

128.119.40.64/28

**P17. Suppose datagrams are limited to 1,500 bytes (including header) between source Host A and destination Host B. Assuming a 20-byte IP header, how many datagrams would be required to send an MP3 consisting of 5 million bytes? Explain how you computed your answer.**

MP3 file size = 5 million bytes.

each datagram can carry 1500-40=1460 bytes of the MP3 file.

Number of datagram = 5 \* 10^6 / 1460 = 3425

**P21. Consider the SDN OpenFlow network shown in Figure 4.30. Suppose that the desired forwarding behavior for datagrams arriving at s2 is as follows:**

**• 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;**

**• 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;**

**• any arriving datagrams on input ports 1 or 2 and destined to hosts h3 or h4 should be delivered to the host specified;**

**• hosts h3 and h4 should be able to send datagrams to each other.**

**Specify the flow table entries in s2 that implement this forwarding behavior.**

s2 flow table

|  |  |
| --- | --- |
| Match | Action |
| Ingress Port: 1; IP Src: 10.3.\*.\*; IP Dst: 10.1.\*.\* | Forward(2) |
| Ingress Port: 2; IP Src: 10.1.\*.\*; IP Dst: 10.3.\*.\* | Forward(1) |
| Ingress Port: 1; IP Dst: 10.2.0.3 | Forward(3) |
| Ingress Port: 2; IP Dst: 10.2.0.3 | Forward(3) |
| Ingress Port: 4; IP Src=10.2.0.4; IP Dst: 10.2.0.3 | Forward(3) |
| Ingress Port: 1; IP Dst: 10.2.0.4 | Forward(4) |
| Ingress Port: 2; IP Dst: 10.2.0.4 | Forward(4) |
| Ingress Port: 3; IP Src=10.2.0.3; IP Dst: 10.2.0.4 | Forward(4) |

**P23. Consider again the scenario from P21 above. Give the flow tables entries at packet switches s1 and s3, such that any arriving datagrams with a source address of h3 or h4 are routed to the destination hosts specified in the destination address field in the IP datagram. (Hint: Your forwarding table rules should include the cases that an arriving datagram is destined for a directly attached host or should be forwarded to a neighboring router for eventual host delivery there.)**

S1 flow table

|  |  |
| --- | --- |
| Match | Action |
| IP Src = 10.2.\*.\*; IP Dst = 10.1.0.1 | Forward (2) |
| IP Src = 10.2.\*.\*; IP Dst = 10.1.0.2 | Forward (3) |
| IP Src = 10.2.\*.\*; IP Dst = 10.3.\*.\* | Forward (1) |

S3 flow table

|  |  |
| --- | --- |
| Match | Action |
| IP Src = 10.2.\*.\*; IP Dst = 10.3.0.6 | Forward (1) |
| IP Src = 10.2.\*.\*; IP Dst = 10.3.0.5 | Forward (2) |
| IP Src = 10.2.\*.\*; IP Dst = 10.1.\*.\* | Forward (3) |