

hw4

P8, P10, P11

P8 Consider a datagram network using 32-bit host addresses. 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 00111111 11111111 11111111	0
11100000 01000000 00000000 00000000 through 11100000 01000000 11111111 11111111	1
11100000 01000001 00000000 00000000 through 11100001 01111111 11111111 11111111	2
Otherwise	3

- a. Provide a forwarding table that has five entries, uses longest prefix matching, and forwards packets to the correct link interfaces. 提示：补充一个第 3 个地址块之后的一块地址（假设为地址块 4），使得 地址块 1 + 地址块 2 + 地址块 3 + 地址块 4 正好等于某个前缀

- b. Describe how your forwarding table determines the appropriate link interface for datagrams with destination addresses:

11001000 10010001 01010001 01010101

11100001 01000000 11000011 00111100

11100001 10000000 00010001 01110111

a.

Prefix	Link Interface
11100000 00*	0
11100000 01000000*	1
1110000*	2
11100001 1*	3
otherwise	3

b)

11001000 10010001 01010001 01010101 与第 5 个表项即 otherwise 匹配，转发给链路 3

11100001 01000000 11000011 00111100 与第 3 个表项匹配，转发给链路 2

11100001 10000000 00010001 01110111 与第 3 和第 4 个表项匹配，更长匹配为第 4 个表项，转发给链路 3

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

Prefix	Link Interface
1	0
10	1
111	2
otherwise	3

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

Prefix	Link Interface	Address range	# addresses
1	0	11000000 - 11011111	32
10	1	10000000 - 10111111	64
111	2	11100000 - 11111111	32
otherwise	3	00000000 - 01111111	128

P11 Consider a router that interconnects three subnets: Subnet 1, Subnet 2, and Subnet 3. Suppose all of the interfaces in each of these three subnets are required to have the prefix 223.1.17/24. Also suppose that Subnet 1 is required to support at least 60 interfaces, Subnet 2 is to support at least 90 interfaces, and Subnet 3 is to support at least 12 interfaces. Provide three network addresses (of the form a.b.c.d/x) that satisfy these constraints

$$256 = 128 + 64 + 16 + 16$$

223.1.17.0/26

223.1.17.128/25

223.1.17.192/28

可以有多个答案，注意子网 1 和子网 2 要求前缀长度分别为 26 和 25.而子网 3 的前缀长度可以为 26, 27 或 28.