

CENG393 Computer Networks

Labwork 7

Routing and Forwarding

1 Routing and Forwarding

When a packet whose destination is not in the same network with the source device has been received by a switch, it will be forwarded to the network router. When routers receive such packages, they must forward these packages to the correct network. For example, assume that a packet with destination address 45.198.75.136 has arrived at Router 1 in Figure 1 below:

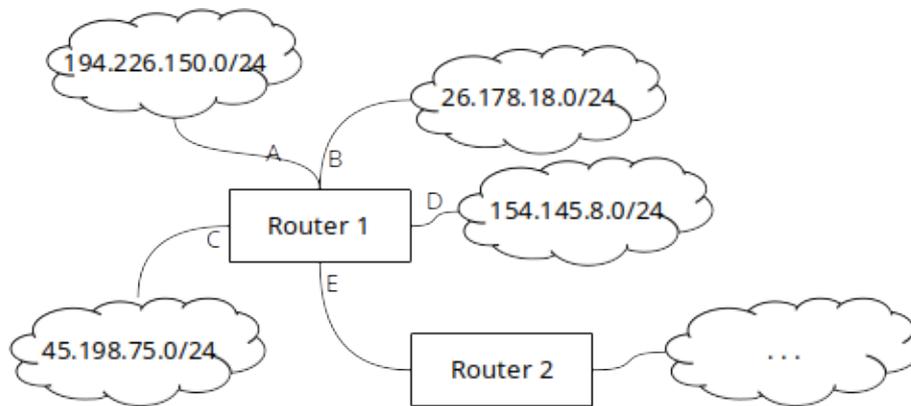


Figure 1: Sample Networks

In order to forward this packet to the correct destination, the router must do Bitwise AND operation on the IP and subnet mask in each entry in its routing table (Table 1). If the result matches with any of the networks in routing table, the router forwards this packet to that destination. If there are no matches, the router forwards this packet to default route (if any specified).

Network	Subnet mask	Destination
194.226.150.0	255.255.255.0	A
26.178.18.0	255.255.255.0	B
45.198.75.0	255.255.255.0	C
154.145.8.0	255.255.255.0	D
0.0.0.0	0.0.0.0	E

Table 1: Sample Routing Table

2 Exercises

1. Lets assume a router has the following routing table:

Network	Subnet mask	Destination
74.83.64.0	255.255.192.0	A
185.188.11.0	255.255.255.0	B
15.206.16.0	255.255.248.0	C
15.206.24.0	255.255.248.0	D
104.208.0.0	255.248.0.0	E
104.232.0.0	255.248.0.0	F
0.0.0.0	0.0.0.0	G

Find out which networks each of the following IP addresses will be forwarded to:

- 104.208.196.45
 - 185.188.11.6
 - 185.188.12.72
 - 104.239.156.16
 - 74.83.77.111
 - 104.200.66.160
 - 15.206.22.135
 - 104.208.89.17
 - 15.206.27.245
 - 104.20.210.88
2. In this exercise, you are expected to develop a routing simulation using C programming language. Assume destination addresses in a network are given with the following format:

`NetworkID : HostID`

The network part can be a 1 or 2 digit(s) number and the host part is a 2 or 3 digits number. The total number of digits in an address should be 4. The routing table has the following format:

`DestinationAddress, NrOfDigitsInNetworkPartOfAddress, OutgoingConnection`

For example “2300, 2, A” means the network part of the address is 23 and all messages for this network should be forwarded over connection A. Furthermore assume a message has the following format:

`DestinationAddress, SourceAddress, MessageBody`

For instance “1422, 2534, "Hello"” is a message from 2534 to 1422 having “Hello” in its body. Write a program to read a list of messages and print the outgoing connection used for each one. Use the routing table and message list in Appendix A and Appendix B.

Appendices

A Packets.txt

```
1422, 2320, Hello  
1316, 1422, NoReply  
3001, 2000, Good  
1410, 3000, Hello  
3019, 2000, Thanks
```

B RoutingTable.txt

```
1300, 2 , A  
1400, 2 , B  
2000, 1 , C  
3000, 3 , D  
3010, 3 , E
```