

# CENG393 Computer Networks

## Labwork 3

### 1 Routing and Forwarding

When a packet with a specific destination address arrives at a router, the router must forward this package 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:

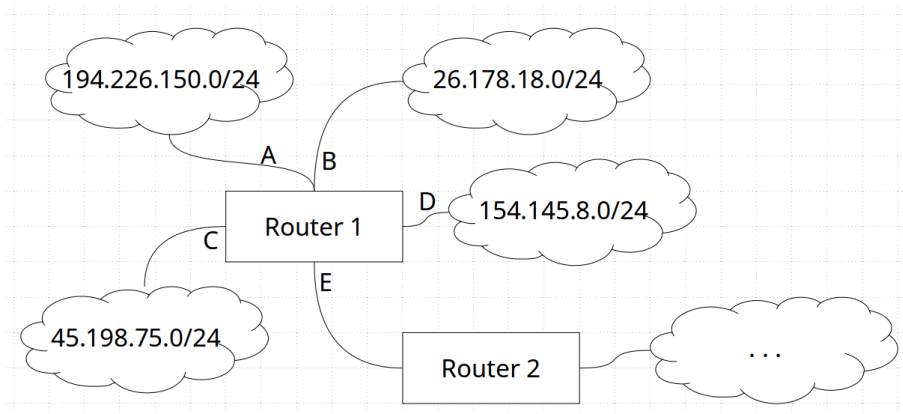


Figure 1: Sample Router

In order to forward this packet to the correct destination, the router must do Bitwise AND operation on the IP and every subnet mask 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 Routing Simulation

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.

## 3 Exercises

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

# 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
```