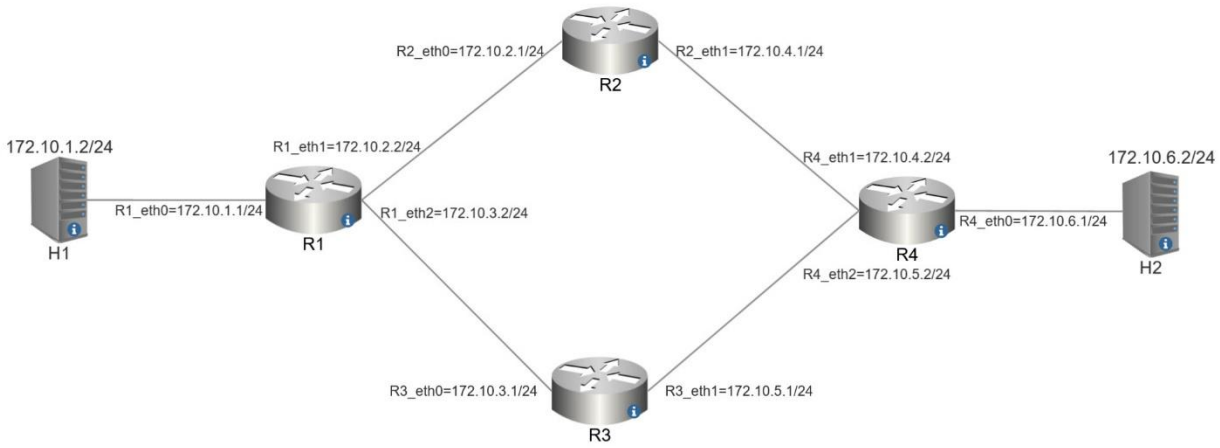


*Figure 1: Network Topology*

**A1:**

I created the above topology on mininet using the mininet Python API. It consists of 2 hosts, H1 and H2, connected through a network of 4 routers R1-R4.

H1 is connected to R1 in subnet 172.10.1.0/24, and H2 is connected to R4 in subnet 172.10.6.0/24. The result of the pingall command can be found in Figure 2, which indicates that all the nodes in the network are connected to each other and there are no message drops.

```
Pinging all nodes and routers
*** Ping: testing ping reachability
H1 -> H2 R1 R2 R3 R4
H2 -> H1 R1 R2 R3 R4
R1 -> H1 H2 R2 R3 R4
R2 -> H1 H2 R1 R3 R4
R3 -> H1 H2 R1 R2 R4
R4 -> H1 H2 R1 R2 R3
*** Results: 0% dropped (30/30 received)
0.0*** Starting CLI:
```

*Figure 2: pingall command result*

**A2:**

I showed routing tables' information of all routers in Figure 3 . Static routing has been enabled, and we can see an entry on each router for every subnet. I used the following command to setup static routing for every interface which is not reachable directly:
ip route add <destination_subnet> via <neighbor_subnet> dev <local_interface>

Also, result of traceroute command between H1 and H2 is shown in Figure 4.

```
R1's Routing Table:
Kernel IP routing table
Destination     Gateway         Genmask         Flags Metric Ref    Use Iface
172.10.1.0      0.0.0.0         255.255.255.0   U     0      0        0 r1_eth0
172.10.2.0      0.0.0.0         255.255.255.0   U     0      0        0 r1_eth1
172.10.3.0      0.0.0.0         255.255.255.0   U     0      0        0 r1_eth2
172.10.4.0      172.10.2.1      255.255.255.0   UG    0      0        0 r1_eth1
172.10.5.0      172.10.3.1      255.255.255.0   UG    0      0        0 r1_eth2
172.10.6.0      172.10.3.1      255.255.255.0   UG    0      0        0 r1_eth2

R2's Routing Table:
Kernel IP routing table
Destination     Gateway         Genmask         Flags Metric Ref    Use Iface
172.10.1.0      172.10.2.2      255.255.255.0   UG    0      0        0 r2_eth0
172.10.2.0      0.0.0.0         255.255.255.0   U     0      0        0 r2_eth0
172.10.3.0      172.10.2.2      255.255.255.0   UG    0      0        0 r2_eth0
172.10.4.0      0.0.0.0         255.255.255.0   U     0      0        0 r2_eth1
172.10.5.0      172.10.4.2      255.255.255.0   UG    0      0        0 r2_eth1
172.10.6.0      172.10.4.2      255.255.255.0   UG    0      0        0 r2_eth1

R3's Routing Table:
Kernel IP routing table
Destination     Gateway         Genmask         Flags Metric Ref    Use Iface
172.10.1.0      172.10.3.2      255.255.255.0   UG    0      0        0 r3_eth0
172.10.2.0      172.10.3.2      255.255.255.0   UG    0      0        0 r3_eth0
172.10.3.0      0.0.0.0         255.255.255.0   U     0      0        0 r3_eth0
172.10.4.0      172.10.5.2      255.255.255.0   UG    0      0        0 r3_eth1
172.10.5.0      0.0.0.0         255.255.255.0   U     0      0        0 r3_eth1
172.10.6.0      172.10.5.2      255.255.255.0   UG    0      0        0 r3_eth1

R4's Routing Table:
Kernel IP routing table
Destination     Gateway         Genmask         Flags Metric Ref    Use Iface
172.10.1.0      172.10.5.1      255.255.255.0   UG    0      0        0 r4_eth2
172.10.2.0      172.10.4.1      255.255.255.0   UG    0      0        0 r4_eth1
172.10.3.0      172.10.5.1      255.255.255.0   UG    0      0        0 r4_eth2
172.10.4.0      0.0.0.0         255.255.255.0   U     0      0        0 r4_eth1
172.10.5.0      0.0.0.0         255.255.255.0   U     0      0        0 r4_eth2
172.10.6.0      0.0.0.0         255.255.255.0   U     0      0        0 r4_eth0
```

*Figure 3: Routing tables of all routers*

```
mininet> H1 traceroute H2
traceroute to 172.10.6.2 (172.10.6.2), 30 hops max, 60 byte packets
 1  172.10.1.1 (172.10.1.1)  0.306 ms  0.280 ms  0.236 ms
 2  172.10.3.1 (172.10.3.1)  0.227 ms  0.206 ms  0.198 ms
 3  172.10.5.2 (172.10.5.2)  0.192 ms  0.175 ms  0.165 ms
 4  172.10.6.2 (172.10.6.2)  0.158 ms  0.144 ms  0.133 ms
mininet> H2 traceroute H1
traceroute to 172.10.1.2 (172.10.1.2), 30 hops max, 60 byte packets
 1  172.10.6.1 (172.10.6.1)  0.218 ms  0.192 ms  0.186 ms
 2  172.10.5.1 (172.10.5.1)  0.180 ms  0.168 ms  0.161 ms
 3  172.10.3.2 (172.10.3.2)  0.154 ms  0.142 ms  0.133 ms
 4  172.10.1.2 (172.10.1.2)  0.175 ms  0.162 ms  0.153 ms
```

*Figure 4: output of traceroute command between H1 and H2*