TCP & UDP
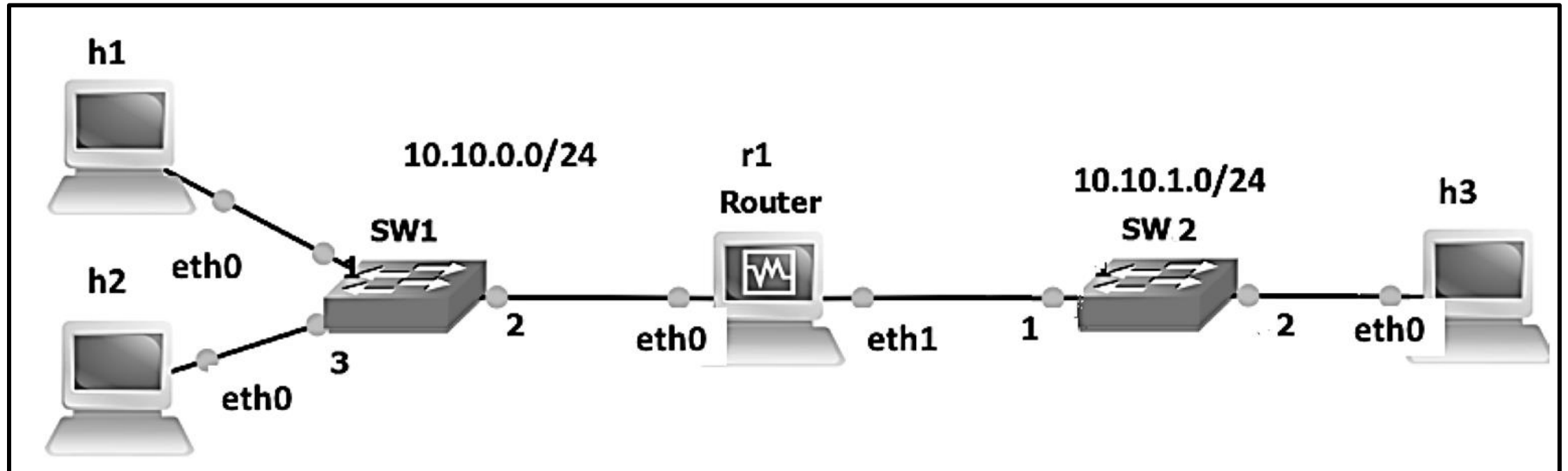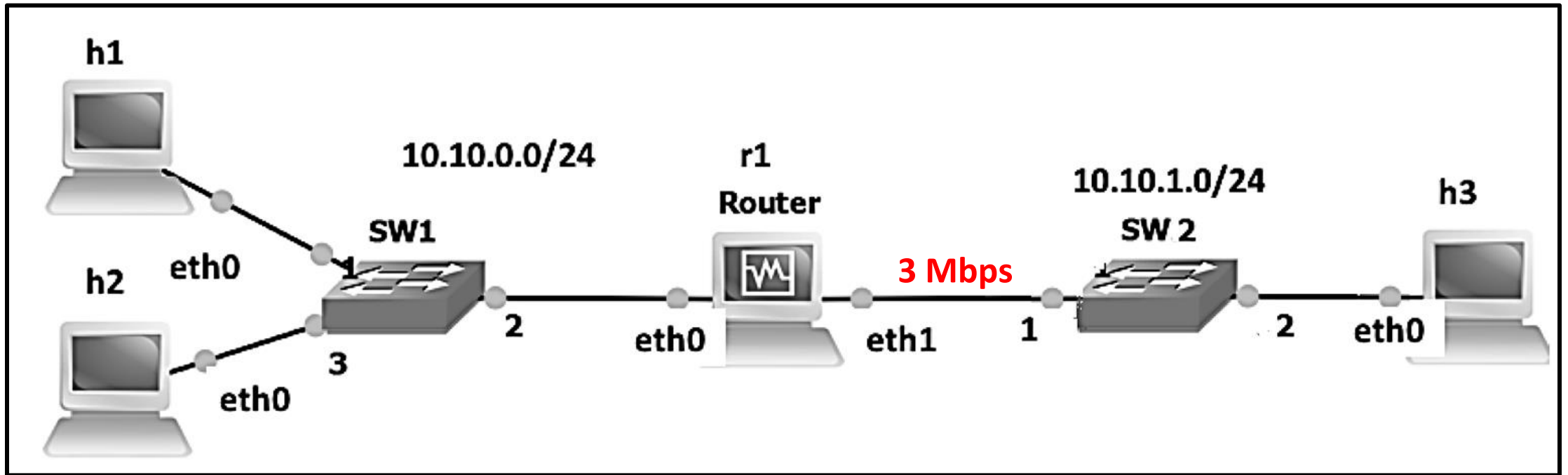
Previous scenario
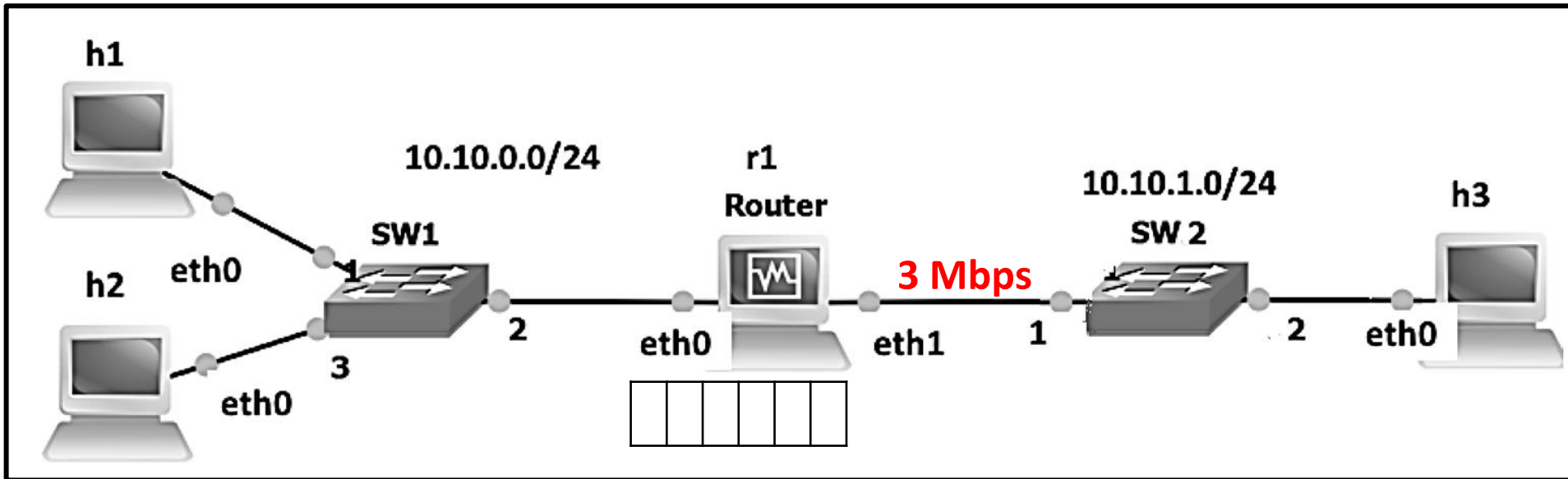
Limitation of the Bandwidth

- link_r1sw2.intf1.config(bw=3)

Competing UDP Flows

Scenario	h1 (UDP)	h2 (UDP)
1	1 Mbps	1 Mbps
2	1 Mbps	2 Mbps
3	1 Mbps	4.5 Mbps

Competing UDP Flows

Scenario	h1 (UDP)	h2 (UDP)
1	1 Mbps	1 Mbps
2	1 Mbps	2 Mbps
3	1 Mbps	4.5 Mbps
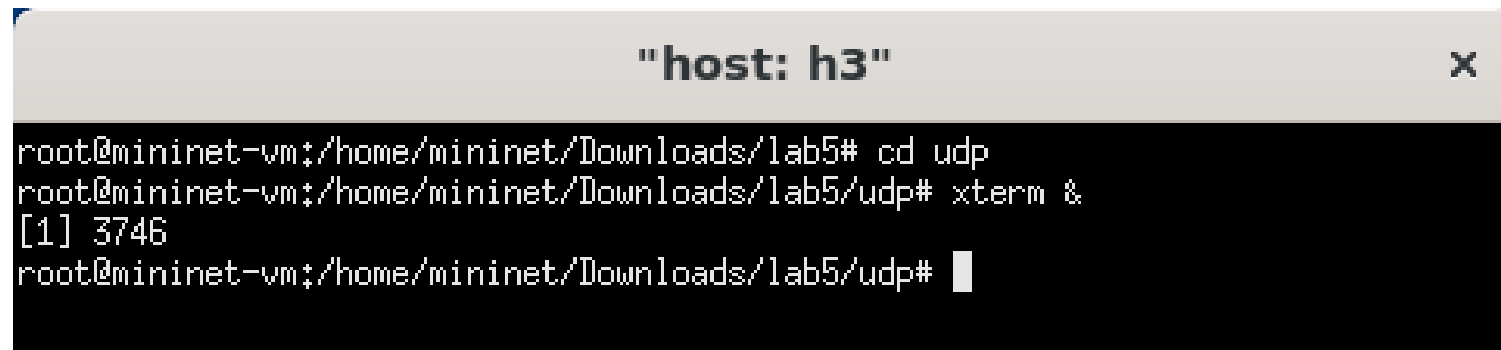
Scenario	Goodput h1	Loss percentage h1	Goodput h2	Loss percentage h2
1	1 Mbps	0%	1 Mbps	0%
2	0.9596 Mbps	4%	1.919 Mbps	4%
3	0.523 Mbps	48%	2.36 Mbps	48%

Two terminals for h3
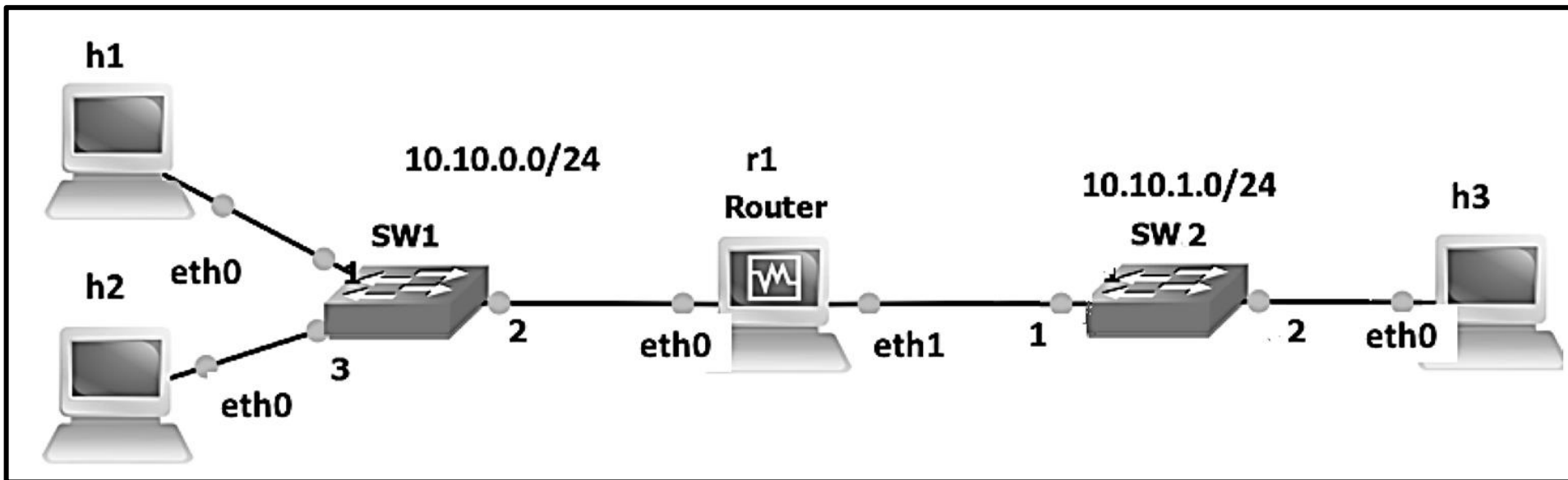
- (h3)# xterm &

xterm &


```
"host: h3"                                        ×

root@mininet-vm:/home/mininet/Downloads/lab5# cd udp
root@mininet-vm:/home/mininet/Downloads/lab5/udp# xterm &
[1] 3746
root@mininet-vm:/home/mininet/Downloads/lab5/udp# █
```

```
root@mininet-vm: /home/mininet/Downloads/lab5/udp  ×

root@mininet-vm:/home/mininet/Downloads/lab5/udp# █
```
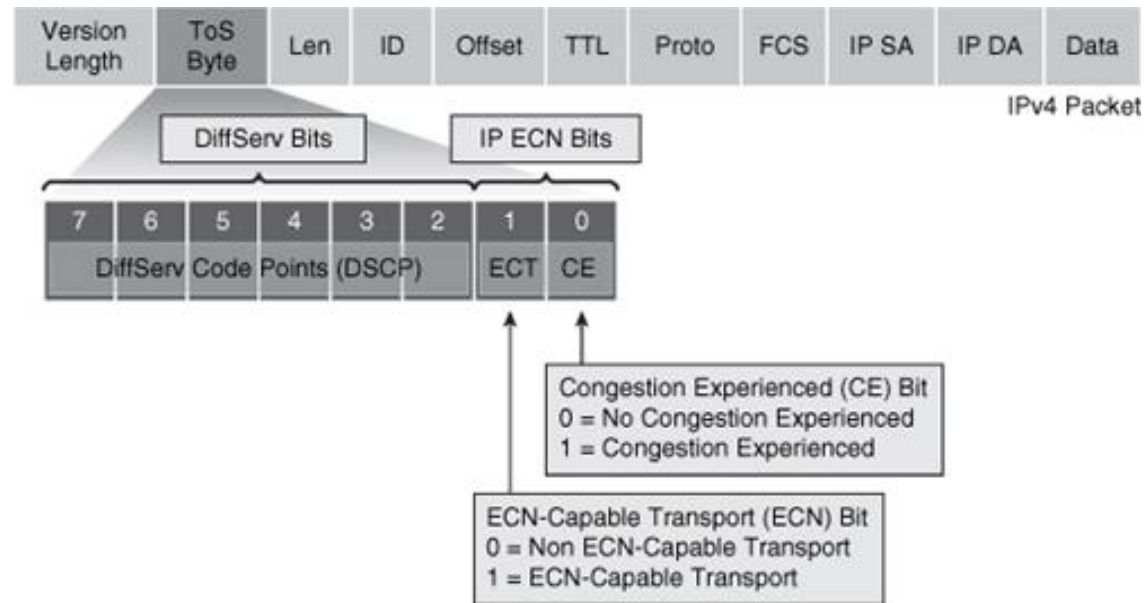
TCP flows Competing with UDP Flows

Scenario	h1 (UDP)	h2 (UDP)	h2 (TCP)
1	1 Mbps	1 Mbps	...
2	1 Mbps	2 Mbps	...
3	1 Mbps	4.5 Mbps	...

Scenario	UDP flow of h1	UDP flow of h2	TCP flow of h2
1	1 Mbps	1 Mbps	0.876 Mbps
2	0.959 Mbps	1.919 Mbps	0 Mbps
3	0.523 Mbps	2.36 Mbps	0 Mbps

Explicit Congestion Notification (ECN)

- An extension to the Internet Protocol

| Version Length | ToS Byte | Len | ID | Offset | TTL | Proto | FCS | IP SA | IP DA | Data |

IPv4 Packet

DiffServ Bits   IP ECN Bits

| 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |

DiffServ Code Points (DSCP)   ECT   CE

Congestion Experienced (CE) Bit
0 = No Congestion Experienced
1 = Congestion Experienced

ECN-Capable Transport (ECN) Bit
0 = Non ECN-Capable Transport
1 = ECN-Capable Transport

- link_r1sw2.intf1.config(bw=5, max_queue_size=1000, enable_ecn=False)
- link_r1sw2.intf1.config(bw=5, max_queue_size=1000, enable_ecn=True)