Q1. Link-layer framing used in the given topology:

• X - Switch: WIRED ETHERNET

• Switch - R1: WIRED ETHERNET

• R1 - R2: WIRED POINT-TO-POINT WAN LINK

• R2 - AP: WIRED ETHERNET

• AP - Y: WIRELESS IEEE 802.11

Q2. For each node in the network:

i. X:

- IP Address: 11.1.1.2

- MAC Address: AF:1D:00:00:01:01

- Interface Type: ETHERNET

ii. Switch:

- MAC Address: AF:1D:00:00:03:01, AF:1D:00:00:03:02

- Interface Type: ETHERNET, ETHERNET

iii. R1:

- IP Address: 11.1.1.1, 11.2.1.1

- MAC Address: AF:1D:00:00:04:01, AF:1D:00:00:04:02

- Interface Type: ETHERNET, WAN

iv. R2:

- IP Address: 11.2.1.2, 11.3.1.1

- MAC Address: AF:1D:00:00:05:01, AF:1D:00:00:05:02

- Interface Type: WAN, ETHERNET

v. AP:

- MAC Address: AF:1D:00:00:06:01, AF:1D:00:00:06:02

- Interface Type: ETHERNET, IEEE 802.11

vi. Y:

- IP Address: 11.3.1.2

- MAC Address: AF:1D:00:00:02:01

- Interface Type: IEEE 802.11

For 100 Mbps link:

X to Y:

Ratio of Packets Received to Packets Transmitted = 1789/1790 = 0.9994

Packets dropped due to Buffer Overflow = 0

Ratio of Packets Retransmitted to Packets Transmitted = 5/1790 = 0.00279

Total number of Packets lost = 1790-1789 = 1

Effective throughput = 0.569736 Mbps

Data link layer Overhead = 1197556 bytes

Payload efficiency = 8916131/ 10113687= 0.88159

Y to X:

Ratio of Packets Received to Packets Transmitted = 1924/1924 = 1

Packets dropped due to Buffer Overflow = 0

Ratio of Packets Retransmitted to Packets Transmitted = 12/1724 = 0.00696

Total number of Packets lost = 1924-1924= 0

Effective throughput = 0.599653 Mbps

Data link layer Overhead = 1293550 bytes

Payload efficiency = 9397154/10690704 = 0.8790

For 5 Mbps link:

X to Y:

Ratio of Packets Received to Packets Transmitted = 1820/1821 = 0.99945

Packets dropped due to Buffer Overflow = 0

Ratio of Packets Retransmitted to Packets Transmitted = 7/1821 = 0.00384

Total number of Packets lost = 1821-1820 = 1

Effective throughput = 0.57377 Mbps

Data link layer Overhead = 1221502 bytes

Payload efficiency = 8968193/10189695 = 0.88012

Y to X:

Ratio of Packets Received to Packets Transmitted = 1924/1924 = 1

Packets dropped due to Buffer Overflow = 0

Ratio of Packets Retransmitted to Packets Transmitted = 5/1924 = 0.00259

Total number of Packets lost = 1924-1924 = 0

Effective throughput = 0.601268 Mbps

Data link layer Overhead = 1287053 bytes

Payload efficiency = 9404190/10691243 = 0.87961

MAC table (Layer 2 switch)

|  |  |  |
| --- | --- | --- |
| Mac Address | Type | OutPort |
| AF1D00000101 | Dynamic | 1 |
| AF1D00000401 | Dynamic | 2 |