Networks Sub-module Assignment

Answers for Part 2

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1. Sketch a topology to accurately reflect the connections of the network described above. Your topology should include all devices mentioned and their connections:

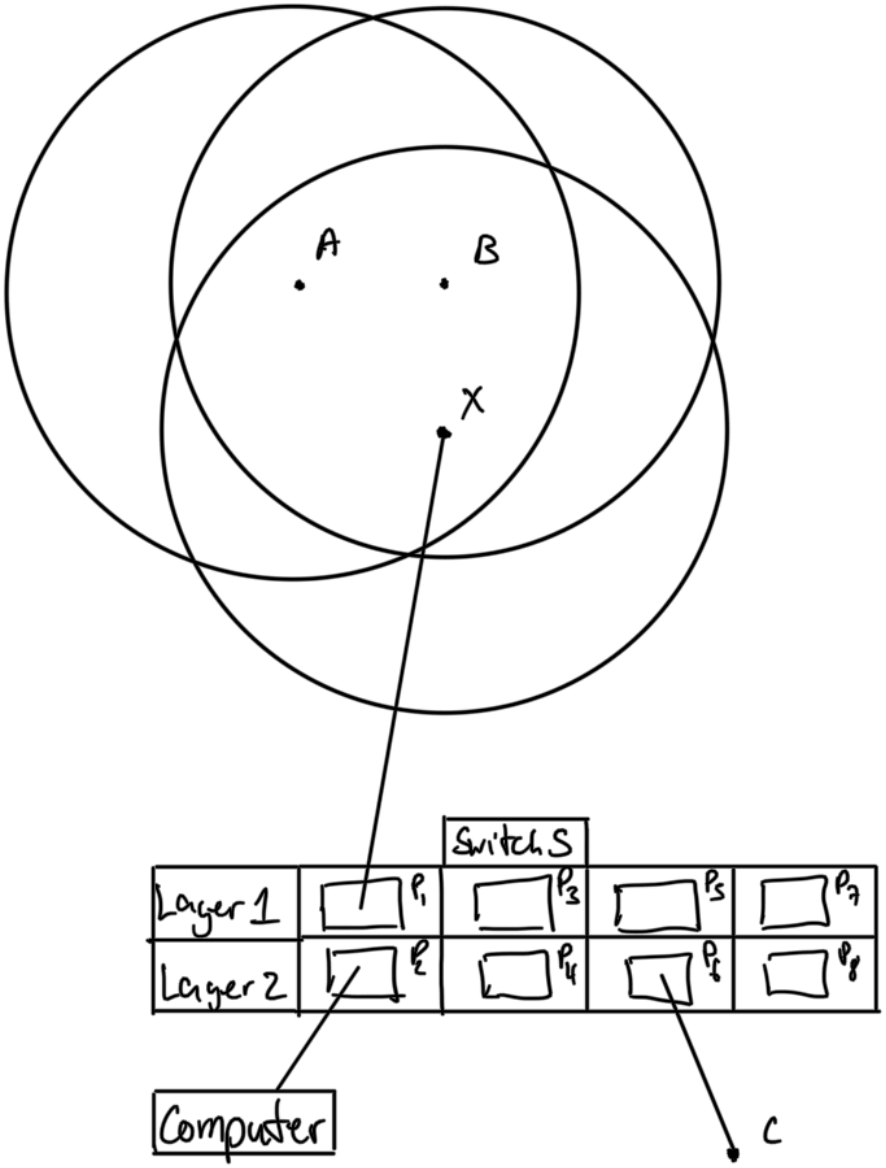

Figure 1: Topology of the the network

Note, for before part 5, ignore the computer node.

2. Which wireless user devices above can receive the frame sent by C? Why?

Answer:

The wireless user device A and B can receive the frame sent by C. Other wireless user devices (If they exists) in X's transmission range can also receive this packet.

Expanation:

This is because both A and B can hear X's transmission. As C sends its frame to X which covers A and B, both devices can receive C's frames (Though there might be some interference).

2.3. At what time does A start sending its frame to X? At what time does B start sending its frame to X? Explain.

Answer:

A sends its frame T = $\mathbf{55\mu s}$

B sends its frame T = $\mathbf{120\mu s}$

Explanation:

C to wireless node covered by X:

T = $0\mu s$, channel idle, send frame immediately.

T = $50\mu s$, finish transmission.

A to X

A backoff timer = $10\mu s$

T = $20\mu s$, channel busy, backoff $10\mu s$.

T = $30\mu s$, channel busy, backoff $10\mu s$.

T = $40\mu s$, channel busy, backoff $10\mu s$.

T = $50\mu s$, channel idle (C finished transmission). Sense to check if idle for DISF duration ($5\mu s$).

T = $\mathbf{55\mu s}$, channel idle for DISF duration, send data to X for the next $60\mu s$ (until T = $115\mu s$)

B to X

B backoff timer = $12\mu s$

T = $40\mu s$, channel busy, backoff $12\mu s$.

T = $52\mu s$, channel idle (C finished transmission). Sense to check if idle for DISF duration ($5\mu s$).

T = $55\mu s$, channel busy, backoff $12\mu s$.

T = $67\mu s$, channel busy, backoff $12\mu s$.

T = $79\mu s$, channel busy, backoff $12\mu s$.

T = $91\mu s$, channel busy, backoff $12\mu s$.

T = $91\mu s$, channel busy, backoff $12\mu s$.

T = $103\mu s$, channel busy, backoff $12\mu s$.

T = $115\mu s$, channel idle (A finished transmission). Sense to check if idle for DISF duration ($5\mu s$).

T = $\mathbf{120\mu s}$, channel idle for DISF duration, send data to X for the next $80\mu s$ (until T = $200\mu s$)

2.4. Give the switching table of S at 60 us. Explain.

Answer:

At T = 60μs, this is our switching table.

MAC	PORT
CC-CC-CC-CC	6
XX-XX-XX-XX	1

Explanation:

As the switch is cold started, we have an empty switching table:

MAC	PORT

As C wants to send a frame to the switch S, we add the source MAC address to the switching table:

MAC	PORT
CC-CC-CC-CC	6

X is not on the switching table, so the switch broadcasts the frame to all ports.

Then, A wants to transmit a frame to C. It sends the data to X, and X sends the frame to switch S. We add the source MAC address of X to the switching table:

MAC	PORT
CC-CC-CC-CC	6
XX-XX-XX-XX	1

T = 60μs, X is still transmitting A's frame to C through switch S, so this is our resulting table.

2.5. f you connect a computer to port 2 of S, which frame(s) can you receive from all the above processes? Explain.

Answer:

The computer can receive the frame C sends to S time T = $0\mu s$

Explanation:

When C sends data to X through switch S, the switching table does not have the destination MAC address (X's), so it has to broadcast the data to all ports (except C's port). As such, a computer on port 2 will receive the frame.

When A and B sends data to C through X and switch S, the destination MAC address (C's) is already on the switching table, so it will unicast the packet, meaning the computer on port 2 will not receive the data.