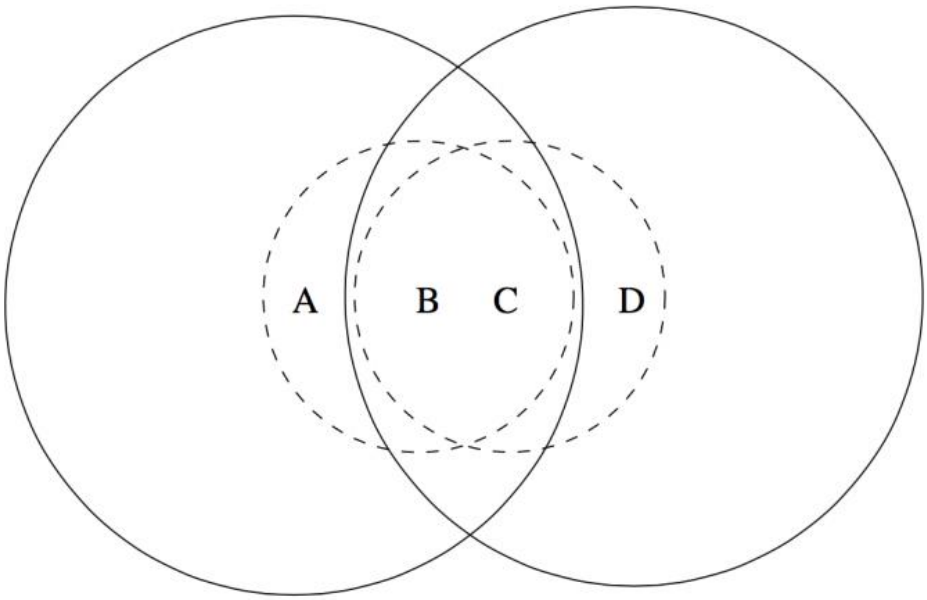
Sample Problems on Erthernet/Wi-Fi

1. Consider the following WLANs topology. The solid circles represent the radio range of A and D respectively. The dashed circles represent the radio range of B and C. Two nodes will interfere at a location if they transmit simultaneously, and their transmission areas overlap.



Case 1: A is sending a frame to B. List the hidden terminals (Those who might interfere with A's transmission or those who A's transmission might interfere with) and the exposed terminals.

Hidden Terminals: _____

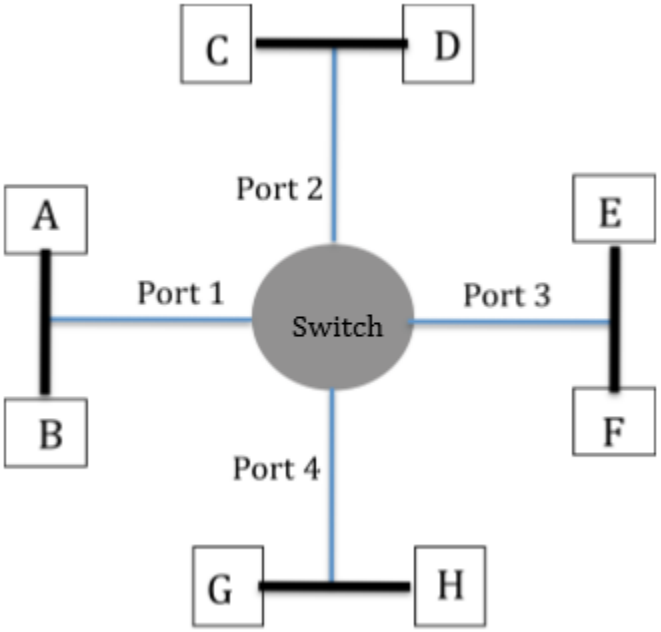
Exposed Terminals: _____

Case 2: Repeat case 1 when B is sending a frame to C

Hidden Terminals: _____

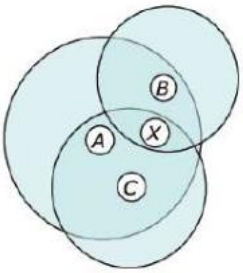
Exposed Terminals: _____

2. Consider the following set of four Ethernet segments connected by an L2 switch. Each Ethernet segment has two hosts on it. Assume at the beginning that the switch has no state about where each of the hosts reside, and will use self-learning to build its forwarding table during the sequence of transmissions listed below. For each step in this sequence of transmissions, list the ports the Ethernet frame is forwarded to by the switch (and, if the frame is not forwarded to any ports, just write drop)



Sequence of Transmissions	Ports
A sends to E	
G sends to E	
E sends to A	
H sends to G	

(10 points) The diagram at right shows a WIFI network with an access point, X and three hosts, A, B and C. The large circles indicate the *coverage areas* of the three hosts. The coverage area for X is not shown, but you may assume that it includes all three hosts. Assume RTS/CTS are not used.



Suppose X is transmitting a packet at time 0 and finishes sending it at time 100 μs. Also,

- A gets a packet to send at time 50 that takes 100 μs to send and is assigned a backoff timer of 100.
- B gets a packet at time 70 that takes 200 μs and is assigned a backoff timer of 50.
- C gets a packet at time 90 that takes 150 μs and is assigned a backoff timer of 150.

For each of the three hosts, what time do they start sending their packets? You may ignore the inter-frame spacing and the time required for acks.

Of the three packets sent, which are successfully delivered on the first attempt?

For each packet that is not successfully delivered on the first attempt, approximately when does the sending host learn that the packet was lost and must be sent again?

Now, suppose RTS/CTS is enabled. In this case, approximately when does each host send its data packet? You may assume that the time needed to send RTS, CTS and ACK packets is negligible.