

UNIVERSITY OF CALIFORNIA, LOS ANGELES  
CS M117

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Discussion: 1B

**Bluetooth Communications**

Pre-laboratory HW #3 Due 04/20  
(HW must be typed)

**Section A:**

1. (4) Wireless nets:

(a) What is the main similarity between a Wireless LAN and an Ad Hoc network

(b) What is the main difference?

(a) Wireless LAN and Ad Hoc networks are both wireless and allow connection between computers/nodes.

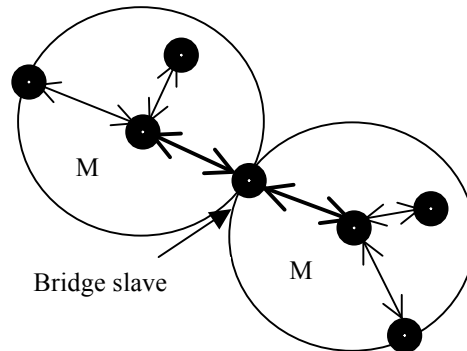
(b) Wireless LAN will connect to a central source such as a router that serves as an infrastructure backbone, while Ad Hoc has independent node communication.

2. (4) Why is multihopping used in Ad-Hoc nets?

Multihopping allows for relaying of signals through the intermediate nodes in Ad Hoc networks, when it is otherwise impossible to do so. It helps in saving resources, and maximizing channel utilization and efficiency amongst other things.

**Section B:**  
**Bluetooth Communications**  
**(T. Ch. 4. 310-317)**

1). (4) From Figure 1 shown bellow; we see that a Bluetooth device can be in two piconets at the same time.



*Figure 1*

Is there any reason why one device cannot be the master in both of them at the same time?

Masters create a frame with a unique prefixing access code so that its slaves can determine the message's origin piconet. Since these access codes are dependent on the masters, if one master was shared between two piconets, the access codes would no longer be unique and the slaves would not be able to distinguish as to which piconet the message came from – or it makes it into a single piconet. In addition to this issue, because the header only contains 3 bits, each piconet has a maximum slave capacity of 7 children, which may be insufficient to label each slave uniquely.

2). (4) Figure 2 shows several physical layer protocols. Which of these is closest to the Bluetooth physical layer protocol?

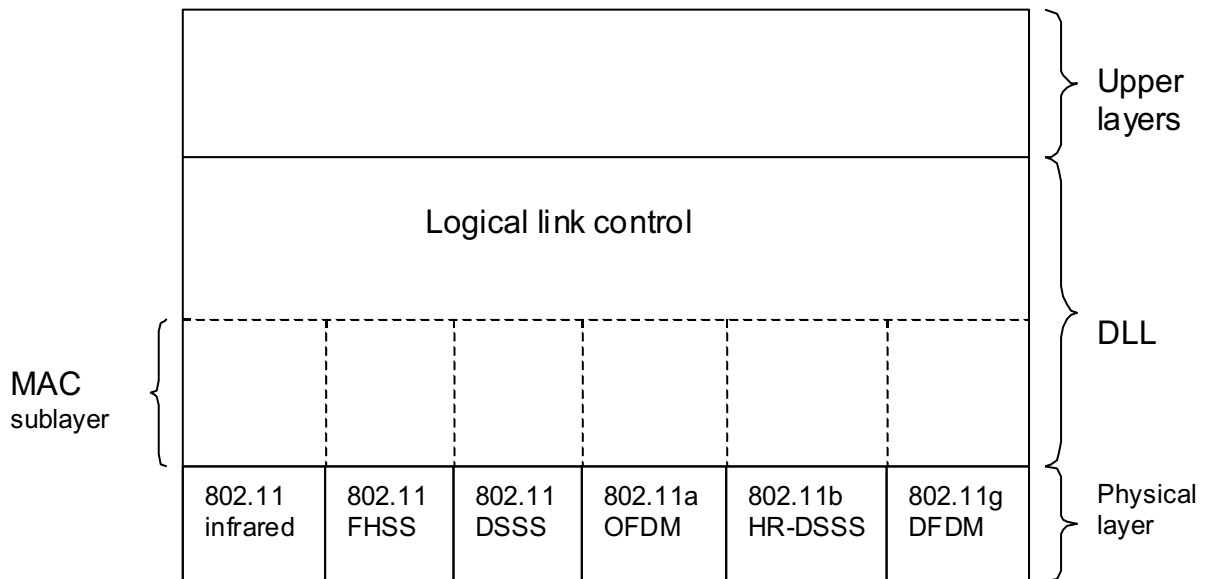


Figure 2

What is the biggest difference between the two?

Bluetooth uses a sub-type of Frequency Hopping Spread Spectrum called Adaptive Frequency Hopping Spread Spectrum. Thus it is most similar to *802.11 FHSS*. The key difference between the two is that Bluetooth has much faster hops than the generic FHSS. The hopping speed of Bluetooth is estimated around 1600 hops/second.

3). (4) Beacon frame in the frequency hopping spread spectrum variant of 802.11 contain the dwell time, Do you think the analogous beacon frame in Bluetooth also contain the dwell time? Discuss your answer.

Bluetooth has a well defined dwell time of 625 $\mu$ s which only allows the transmission of a single packet, which is thus not contained in the beacon frame as this has varying dwell times, and so NO, the beacon frame in Bluetooth probably does not contain the dwell time.