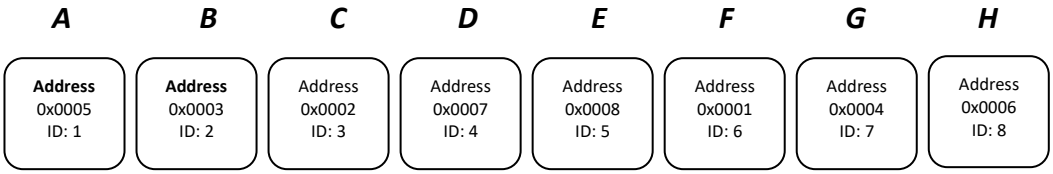
Design of Wireless Communication Networks 2016

Design Challenge 1

1. Each team will use 8 devices
2. A linear topology A-B-C-D-E-F-G-H will be used. MAC addresses of devices will be randomly picked to each of the 8 positions. (i.e., 0x0005 to A, 0x0003 to B, 0x0002 to C, and etc.) The distance and the antenna gain will be adjusted so that devices can only hear neighbors in **two hops** (for example, A can only hear B and C, H can only hear F and G, D can hear B, C, E, and F).
3. Devices are powered on from the left to the right. When it is powered on, it has to show its ID**.** The ID (not the MAC address) is determined based on the order a device is powered on. For example, a device placed in position D will have an "ID" =4. Once a device determines its ID (say, X), it has to blink an LED for X times to show that it does obtain the correct IDs.
4. When the device at H finishes its blinking, it should broadcast a “Flag” message and then sleep for 5 seconds. The “Flag” message should be distinguishable from all other messages. (You should specify the format and content of your flag message.)
5. All devices should send a message (including the ID it obtains in step 3) to the rightmost device (i.e., the device placed at H). That device is connected to a laptop to show the reception time and the content of the message for each received.
6. The starting time for all other devices to send a message to the device at H is when the device at H finishes its sleeping. (How other knows that the device at H has finished sleeping... well… that is the challenge)

Topology



In the figure above, the "address" is the MAC address of each device which you should set to the value that is specified by TAs.

Console in the Laptop attached to the device at H

Time1: Address:0x0005 / ID:1
Time2: Address:0x0007 / ID:2
Time3: Address:0x0003 / ID:3
Time4: Address:0x0002 / ID:4
Time5: Address:0x0001 / ID:5
Time6: Address:0x0008 / ID:6
Time7: Address:0x0004 / ID:7

Check list:

1. Show the results as indicated in the figure on page 1.
2. Record the total number of messages received by the device at H, starting from the time when the device at H finishes its sleeping. (Note that in order for the device at H to receive the IDs of all other devices, many "control" or "routing messages might be generated by the 8 devices).
3. Record the duration between the time when the device at H finishes its sleeping and the time when it collects (ID) messages from all other devices.

Grading:

1. If the check list item 1 is completed, you get 80.
2. If the values of check list items 2 and 3 are smallest, you get extra bonus.
3. If you clearly explain your protocol with the sniffed data at position H, you get extra bonus (5~10).