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Hands-on Internet of Things Specialization

IoT Communications Week 2

Question 1:

What is the "hidden terminal" problem, in the context of wireless communications?

When a sender A communicates with a destination D, but its communications collide with a node B, where B is within D's radio range but not within A's.

Question 2:

True or False: Collision Detection is better than Collision Avoidance for wireless networking.

False

Question 3:

What is the primary goal of a MAC protocol?

Control how devices gain network access to a medium and acquire permission to transmit data.

Hands-on Internet of Things Specialization

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Question 4:

Why is Collision Detection (CD) not often used for Wireless MAC Protocols?

Hidden terminal problem.

Question 5:

Assume that no CA/CD is being performed in a wireless network with 2 nodes and one AP. At time t = 0, node N1 starts transmitting a message over the span of 5 seconds. At time t = 2, node N2 starts transmitting a message over the span of 5 seconds using the same frequency N1 is using and to the same AP.

Neither N1's nor N2's message will be received.

Question 6:

Daniel defines a new protocol to save power in his IoT network. All devices in Daniel's network will go to sleep for 30 seconds after 30 seconds of being awake. This process will repeat, forever. Nodes will rely solely on their local clocks to know when to wake and sleep.
What is one problem with Daniel's protocol?

Clock drift.

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IoT Communications Week 2

Question 7:

Rushi defines a new power saving protocol with a Beacon that determines superframes as discussed in lecture. Within a super frame, nodes sleep for 0.1 nanoseconds and are awake for 0.05 nanoseconds. He champions this protocol because nodes are asleep ⅔ of the time and the response time between sleep periods is short. What is one problem with Rushi's protocol?

Warm-up time.

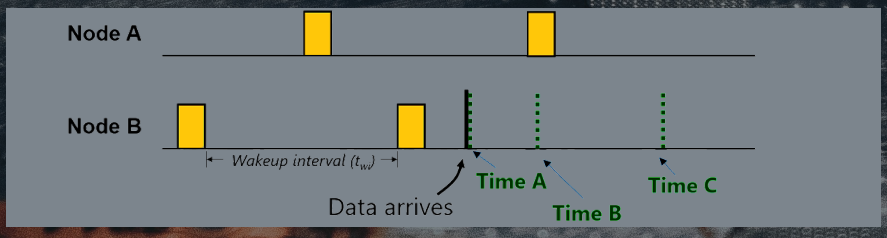
Question 8:

Imagine that a device D wants to transmit to an AP. D waits until all devices that are visible to D are not transmitting before D sends its data to the AP. Does D's strategy prevent collisions at the AP?

No

Question 9:

Consider the following time-series diagram, showing two nodes using Long Preamble Emulation (LP):



At what time would node B transmit its data?

Time C

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IoT Communications Week 2

Question 10:

You want to choose a Wireless MAC that minimizes the use of the wireless channels when there is no application data to send. Which of the following Wireless MACs is the best choice for that task:

Long Preamble Emulation (LPE)

Question 11:

True or False: Non-Beacon Mode algorithms let nodes autonomously discover each other's wake times on demand.

True

Question 12:

You are using Long Preamble Emulation (LPE) as a Wireless MAC, and you have the wakeup interval set for twi seconds on all nodes. Node A wants to send data for Node B. Assume there are no node failures and that A's and B's intervals overlap. What is the minimum number of seconds that node A has to send write requests before it can be sure that B received the messages. Note that B only ACKs that it has received all the data in this question. Note the wi is subscript font

twi

Hands-on Internet of Things Specialization

IoT Communications Week 2

Question 13:

True or False: protocols that use beacons and a Coordinator can only have one Coordinator in their network.

False

Question 14:

What is the standard number IEEE assigned for the IoT wireless MACs discussed in class?

802.15.4

Question 15:

True or False: LLDP uses IP addresses to discover neighbors in its subnet.

False

Question 16:

You walk into your dentist's office, open up your laptop, and want to connect my laptop to the internet. You click on the 'Wi-fi' tab and click on "HappyTeethGuestWireless" to connect to the internet. What is "HappyTeethGuestWireless" an identifier for?

The SSID that all APs at your dentist's office