CS 118 - Homework 7

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Section 1A

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Problem 1

a

frame no	dst MAC addr	src MAC addr	devices that can get the frame excluding the sender	new entries added into the switch's table (if any)
1	FF-FF-FF-FF-FF-FF	00-00-00-00-00-03	Switch, Node A, Router	<00-00-00-00-00-03, 3> Node B
2	00-00-00-00-00-03	00-00-00-00-00-02	Switch, Node B	<00-00-00-00-00-02, 2> Node A
3	00-00-00-00-00-02	00-00-00-00-00-03	Switch, Node A	-
4	00-00-00-00-00-03	00-00-00-00-00-02	Switch, Node B	-

b

frame no	dst MAC addr	src MAC addr	devices that can get the frame excluding the sender	new entries added into the switch's table (if any)
1	FF-FF-FF-FF-FF-FF	00-00-00-00-00-03	Switch, Node A, Router	-
2	00-00-00-00-00-03	00-00-00-00-00-04	Switch, Node B	<00-00-00-00-00-04, 1> (Router)
3	00-00-00-00-00-04	00-00-00-00-00-03	Switch, Router	-
4	FF-FF-FF-FF-FF-FF	00-00-00-00-00-04	Node C	-
5	00-00-00-00-00-04	00-00-00-00-00-05	Router	-
6	00-00-00-00-00-05	00-00-00-00-00-04	Node C	-
7	00-00-00-00-00-04	00-00-00-00-00-05	Router	-
8	00-00-00-00-00-03	00-00-00-00-00-04	Switch, Node B	-

Problem 2

The main reasoning to go back to step 2 in CSMA/CA is to make the protocol fair to all hosts. We can basically imagine the following scenario. We have two hosts, with host A currently transmitting starting at step 1, the channel is busy, and so host B will freeze its counter that it created after choosing some random backoff timer. Let us assume the current design is to revert back to step 1 instead of step 2. Then once host A is done with using the channel, it will enter the DIFS time, and B will un-freeze its counter and start its timer. Now under this scenario, A will most likely finish the DIFS before B's timer counts down (since DIFS is generally a shorter time span than backoffs), and will then resume transmitting through the channel, thus making it busy again, forcing B to wait. This way we can have it such that A will take up a lot more time using the channel, thus making the policy unfair to B. If however, upon finishing the DIFS, A set back to step 2, wherein it starts its random exponential backoff timer, then this will give B a chance to take over the idle channel with a similar probability to A, thus making the policy fair to both hosts involved.

Problem 3

a

To send an IP Packet from Node B to Node A, we first travel through a wired connection, which will have a 802.3 frame (Ethernet) to the AP and then from the AP to Node A through 802.11 frame (WLAN). Thus we have the following frames and their respective MAC Addresses:

802.3 (Ethernet)
$B \rightarrow AP$: ***Destination*: 00-00-00-00-00-01**; ***Source*: 00-00-00-00-00-02**

802.11 (WLAN)
$AP \rightarrow A$:***Destination*: 00-00-00-00-00-01**; ***Source*: 00-00-00-00-00-04**; ***Router*: 00-00-00-00-00-03**

b

To send an IP Packet from Node A to the Router, we first travel through a wireless connection, which will have a 802.11 frame (WLAN) to the AP and then from the AP to the Router through 802.3 frame (Ethernet). Thus we have the following frames and their respective MAC Addresses:

802.11 (WLAN)
$A \rightarrow AP$: ***Destination*: 00-00-00-00-00-04**; ***Source*: 00-00-00-00-00-01**; ***Router*: 00-00-00-00-00-03**

802.3 (Ethernet)
$AP \rightarrow Router$: ***Destination*: 00-00-00-00-00-03**; ***Source*: 00-00-00-00-00-01**

c

To send an IP Packet from the Router to Node B, we just need to send an 802.3 frame (Ethernet) since the AP's internal switch will handle the forwarding. Thus we have the following frames and their respective MAC Addresses:

802.3 (Ethernet)
$Router \rightarrow B$: ***Destination*: 00-00-00-00-00-02**; ***Source*: 00-00-00-00-00-03**