Homework #2 for CSE824
Due Date: 11:59pm EST, October 13, Tuesday, 2020
Online submission (D2L)

Name: _____Solution_____

Student ID: _____

Problem 1 (Multiple Choices): For each question, please select the correct answer(s) out of the choices (there may be multiple correct choices in a question), each question (5pts).

(1) Which network uses an ad hoc, but NOT the cellular-like infrastructure?
    Your choice: _____
    (A) wireless sensor networks; (B) Wi-Fi AP operation mode; (C) 2G/3G wireless networks;
    (D) Bluetooth peer-to-peer mode.

(2) Which is a case of applying the adaptation guideline over wireless mobile networks?
    Your choice: _____
    (A) opportunistic design approach; (B) protocol layering; (C) end-to-end design argument;
    (D) model-referenced adaptation.

(3) Which is NOT supported by the IEEE 802.11 standard?
 Your choice: _____
    (A) Mobile IP based roaming between different subnets; (B) sending an acknowledgment
    (ACK) for every DATA received with success; (C) RTS-CTS is used to handle the hidden
    terminal issue; (D) roaming among different APs in the same subnet.

(4) Which design principle is used by the Internet but not the telecom-based telephone network?
 Your choice: _____
    (A) both the network core and terminals are smart; (B) prioritize goals given a list of multiple
    goals; (C) circuit switching to provide guaranteed service; (D) end to end argument.

(5) Which architecture choice you select when enabling application-driven traffic filtering (say,
banning access to Facebook or CNN website during working hours in the enterprise WiFi
network setting, while ensuring minimal cost for the overall WiFi network?
Your choice: _____
    (A) Thick AP without AP controller; (B) Thin AP without AP controller; (C) Controllerless
        option but without the cloud service; (D) Thin AP with AP controller.

(6) Which of the principle(s) does the Internet design NOT use?
Your choice: _____

(A) "smart terminal, dumb core" approach; (B) "smart core, dumb terminal" approach; (C) placing the intelligence at the physical layer rather than upper layers; (D) keep per-connection state at routers inside the network core.

(7) Which is NOT true for wireless and mobile networks?
Your choice: _____
    (A) A main challenge is the wireless link issue; (B) Another main challenge is the mobility issue; (C) A main driver for wireless networking design is new wireless communication technologies; (D) A main driver for wireless networking design is new applications and services; (E) Wireless networks can use the same protocols as the wired Internet.

(8) Which issues need to be addressed when applying adaptation guideline?
Your choice: _____
    (A) How many scenarios or cases to handle; (B) when to invoke adaptation; (C) how to perform specific adaptive actions for each case; (D) no need to evaluate adaptation since adaptation is always good and helps to improve performance.

Problem 2 (Short answer): Please *briefly* answer each question.
(1) Some companies want to move the service support for mobile devices (smartphones and tablets) entirely to the Internet cloud servers. Does this violate the end-to-end argument for Internet design since the service complexity is moved away from the end host but shipped to the cloud? (15pts)

(2) Describe why opportunistic design can help to achieve higher performance gain. You can use an example to illustrate your point. (15pts)

(3) Please calculate the overall latency when a WiFi smartphone roams between two different APs work in the IEEE 802.11 standard. You should specify what symbols denote what delay component. Can you identify what delay component in your overall calculation can be significantly further reduced? (15pts)

(4) If you have two wireless channels to use (one with high data rate of 100Mbps, the other with only 300Kbps data rate) at each node (i.e., the node has two wireless transceivers, one for each channel), can you design a better wireless MAC protocol within the CSMA/CA paradigm? The efficiency is defined with respect to both wireless medium access and energy efficiency (i.e., how to maximize power savings at each node). We assume that 300Kbps data rate channel uses much less power than 100Mbps data rate channel. Please briefly justify why your designed MAC solution can outperform the conventional 802.11 MAC which only uses a single channel. Hint: better select channels to transmit RTS, CTS, DATA, and ACK. (15pts)